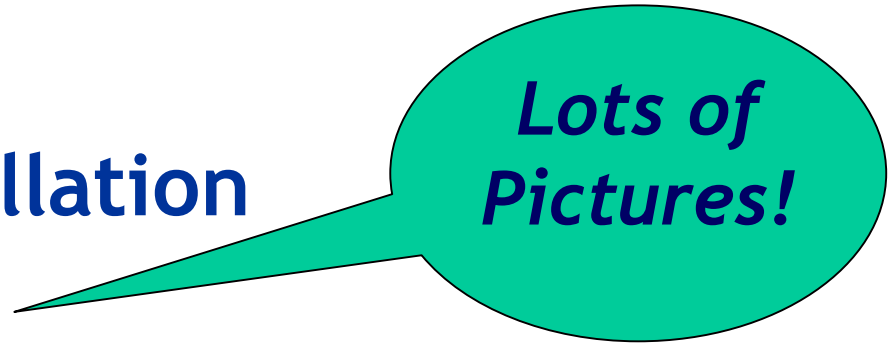
The ICD Project

- Purpose & Location within the DØ Detector
- History: Run 1 vs 2
- Construction & Installation
- Current Status
  - Timing, ADC-GeV Conversion, Calibration, Monte Carlo, High Voltage, Documentation, Shift Work, Maintenance & Repair



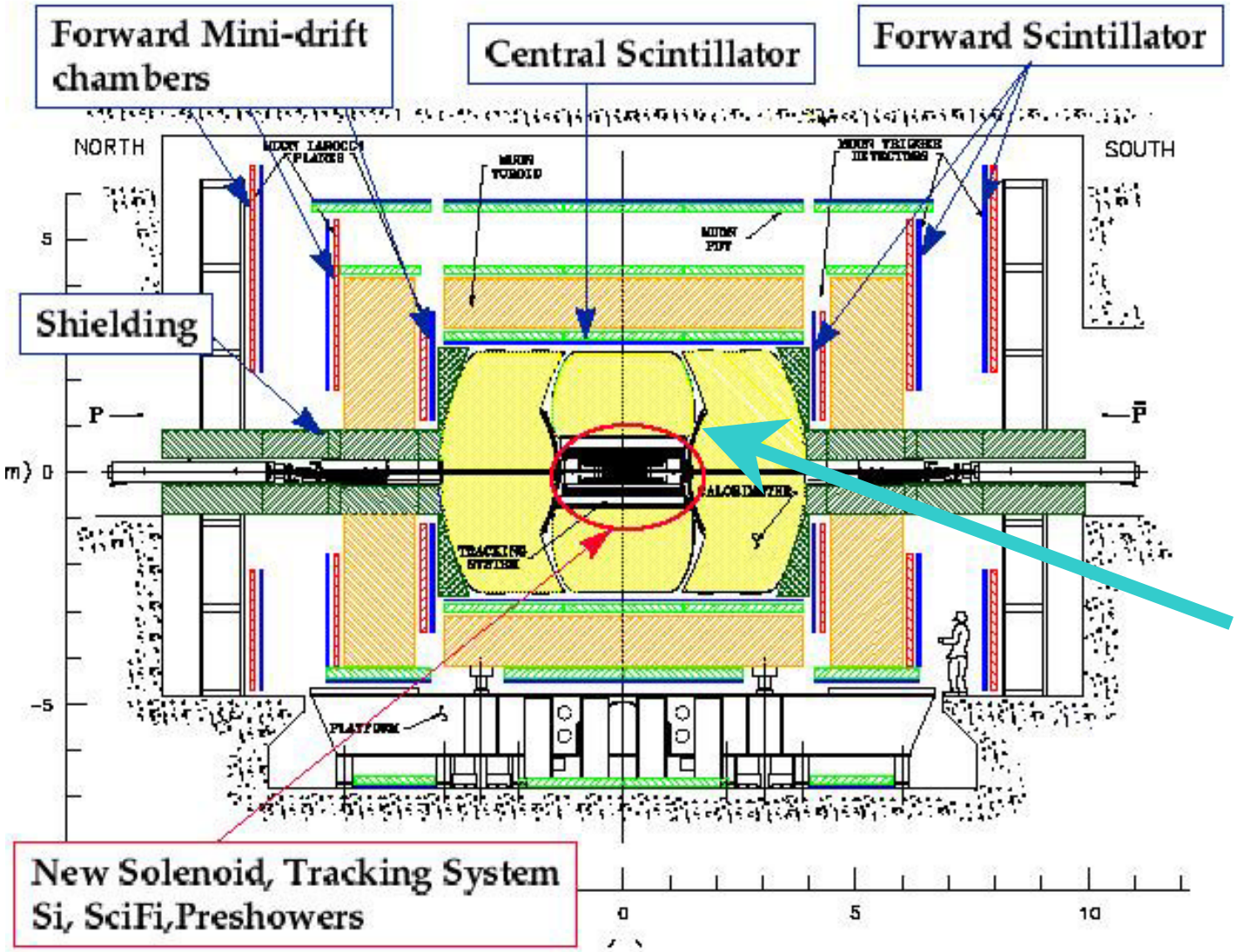
Alan L. Stone

Louisiana Tech University

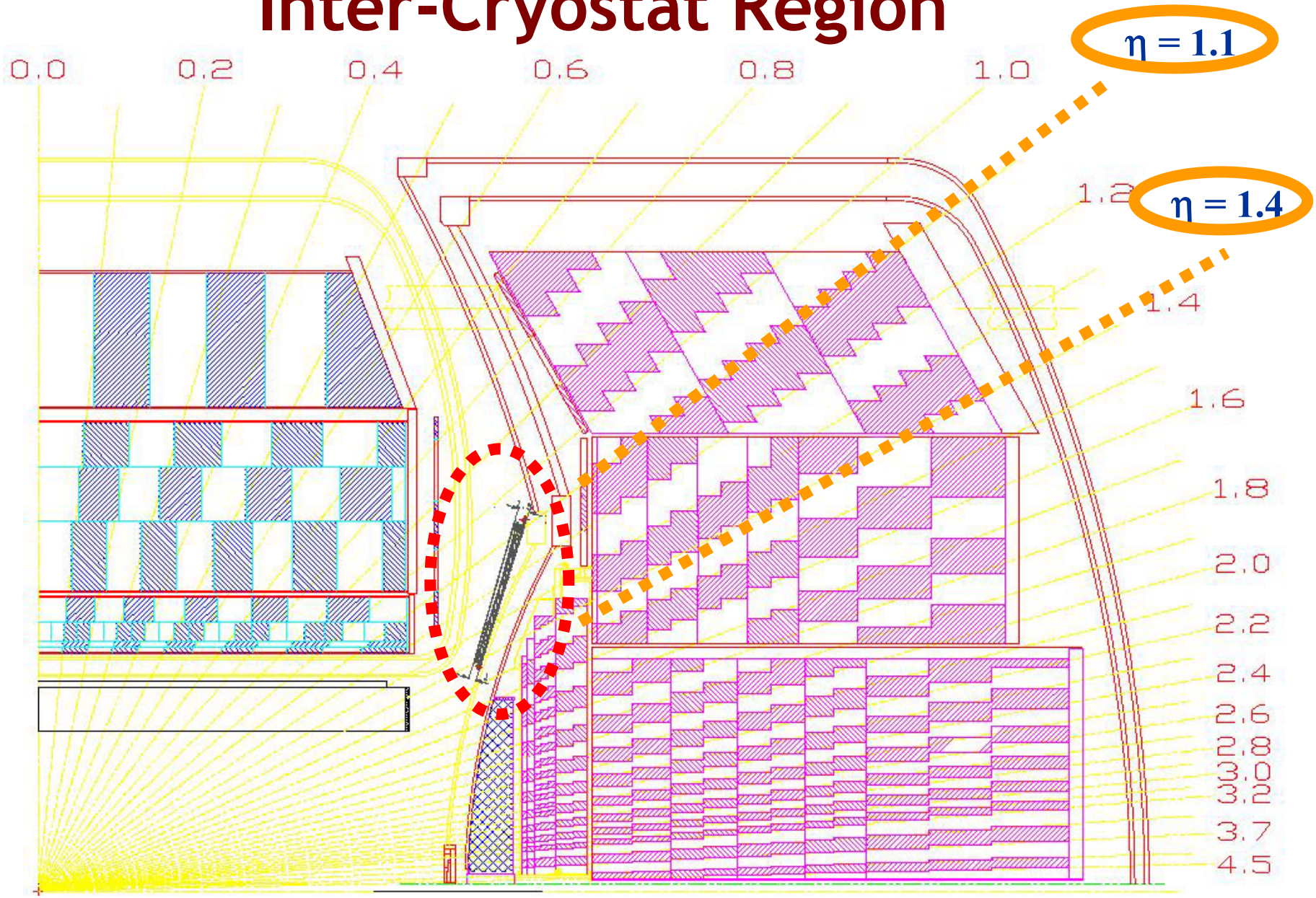
Purpose of ICD

- Enhances the hermeticity and uniformity of the Calorimeter System
  - Rapidly changing material profile & extra "dead" material between the Central & Endcap Calorimeters
  - ICD provides additional sampling in the ICR
- Improves $\not\!\!E_T$ calculation & Jet Energy Resolution
  - Crucial role in coverage of $1.1 < |\eta| < 1.4$
  - Reduce rate of fake $\not\!\!E_T$
- Commissioning of Calorimeter Readout
  - ICD channels "sample" most of the calorimeter readout system - find problems in timing, BLS cards, SCAs, etc.

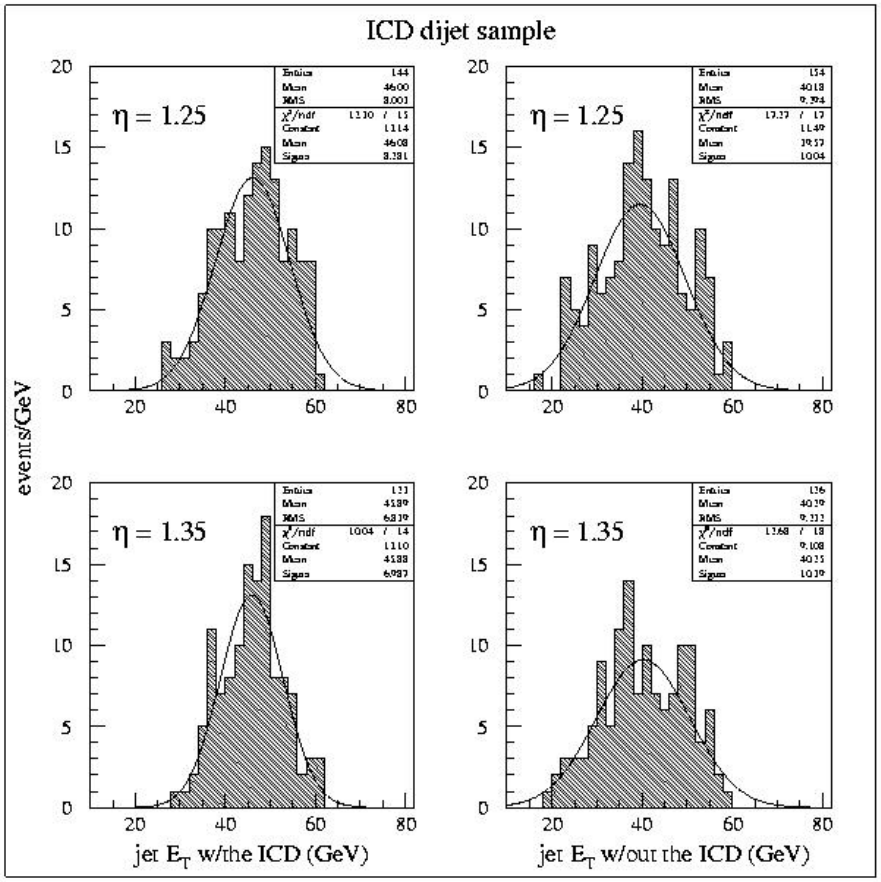
DØ Detector


Forward Mini-drift chambers
Central Scintillator
Forward Scintillator
Shielding
NORTH
SOUTH
New Solenoid, Tracking System
Si, SciFi,Preshowers
+ New Electronics, Trig, DAQ
ICD

Inter-Cryostat Region



Jet Energy Resolution in ICD Region



- Two jet events (Run 1)
  - 1 trigger object in Central Calorimeter - $54<E_T<62$ GeV
  - Other jet in ICD region
    - balances central jet E_T

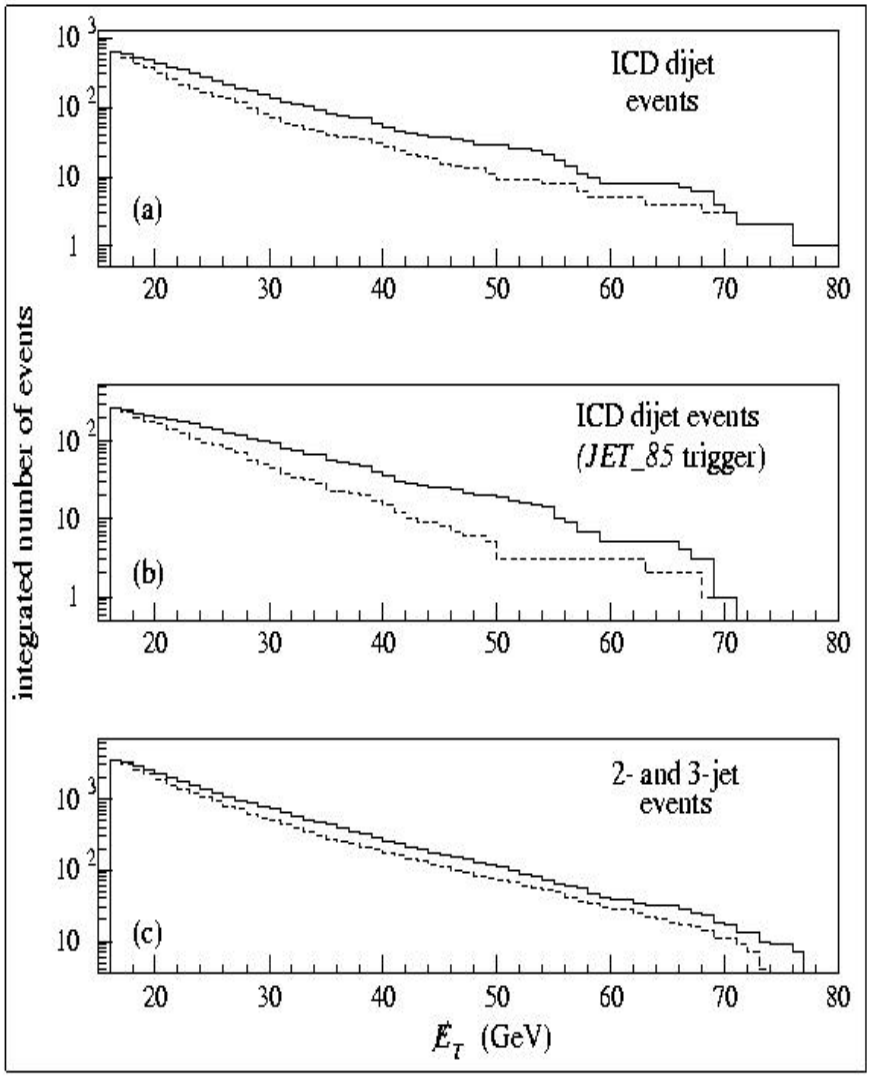
JET ENERGY RESOLUTION VARIATION WITH THE ADDITION OF THE ICD

Eta Bin	with ICD	without ICD	Δ%	Δ% (TB data)
0.85	108.8%	115.5%	+6.7	+11.8
0.95	94.4%	103.9%	+9.5	+19.6
1.05	113.5%	120.0%	+6.5	+9.7
1.15	109.7%	123.9%	+14.2	+21.1
1.25	118.9%	144.0%	+25.1	+74.3
1.35	101.5%	146.0%	+44.5	+115.2

Impact on Missing ET

- Effect of measuring $\not\!\!E_T$
  - ➢ Modify sampling weights for massless gap to best compensate for absence of ICD
- a) Dijets events (previous slide)
- b) + central jet $\not\!\!E_T$>85 GeV
- c) No ICD condition
  - ➢Little intrinsic $\not\!\!E_T$ - what is measured is presumably due to detector effects = "fake"
- An increase in fake $\not\!\!E_T$ is seen in <u>all</u> plots - even when jets are not specifically confined to regions of the calorimeter with ICD coverage.

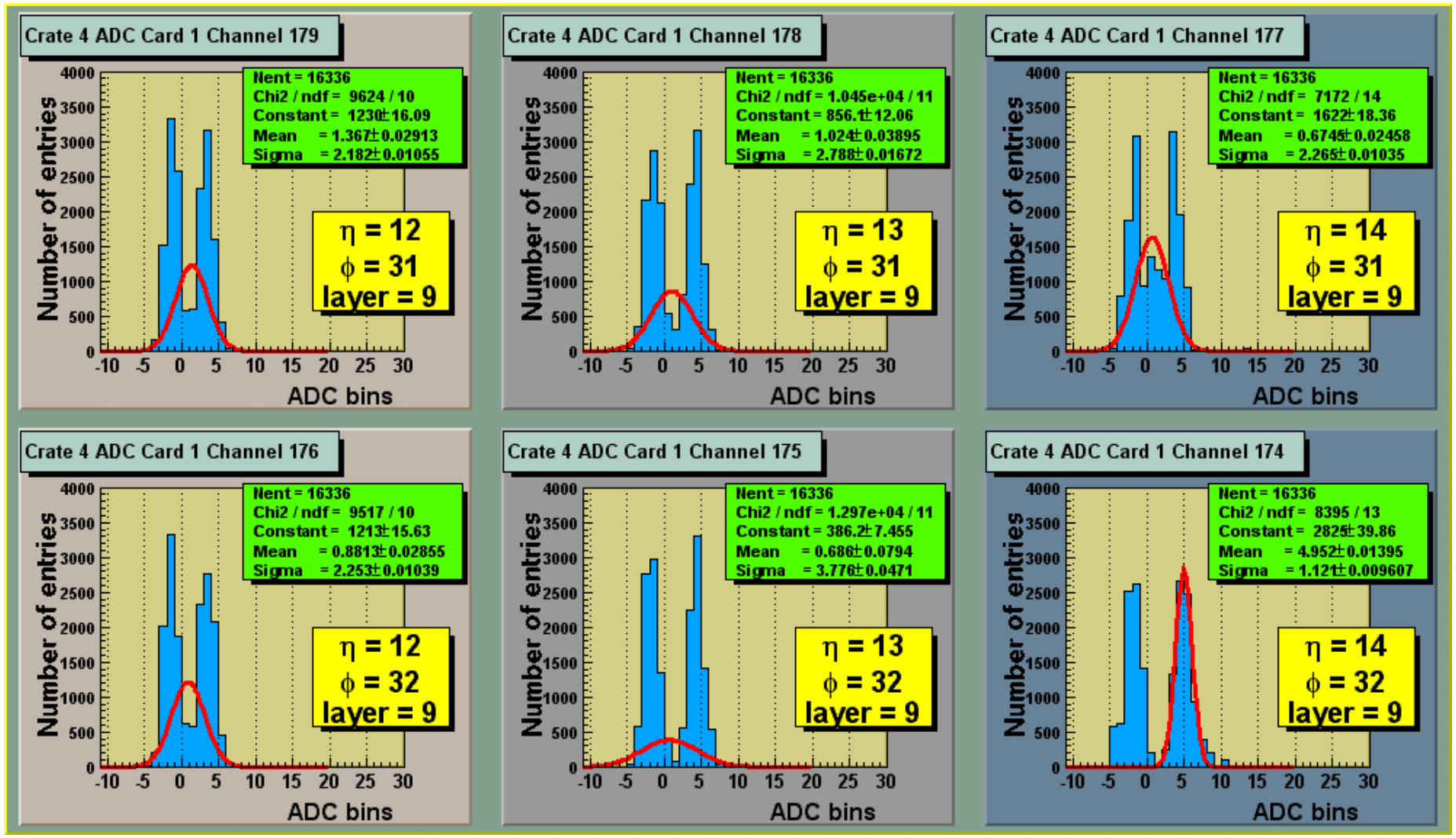
Integrated number of events as a function of missing E_T with ICD (dashed) & without ICD (solid).



Calorimeter Commissioning

ICD is always in layer 9 of Calorimeter

Zero-bias Data

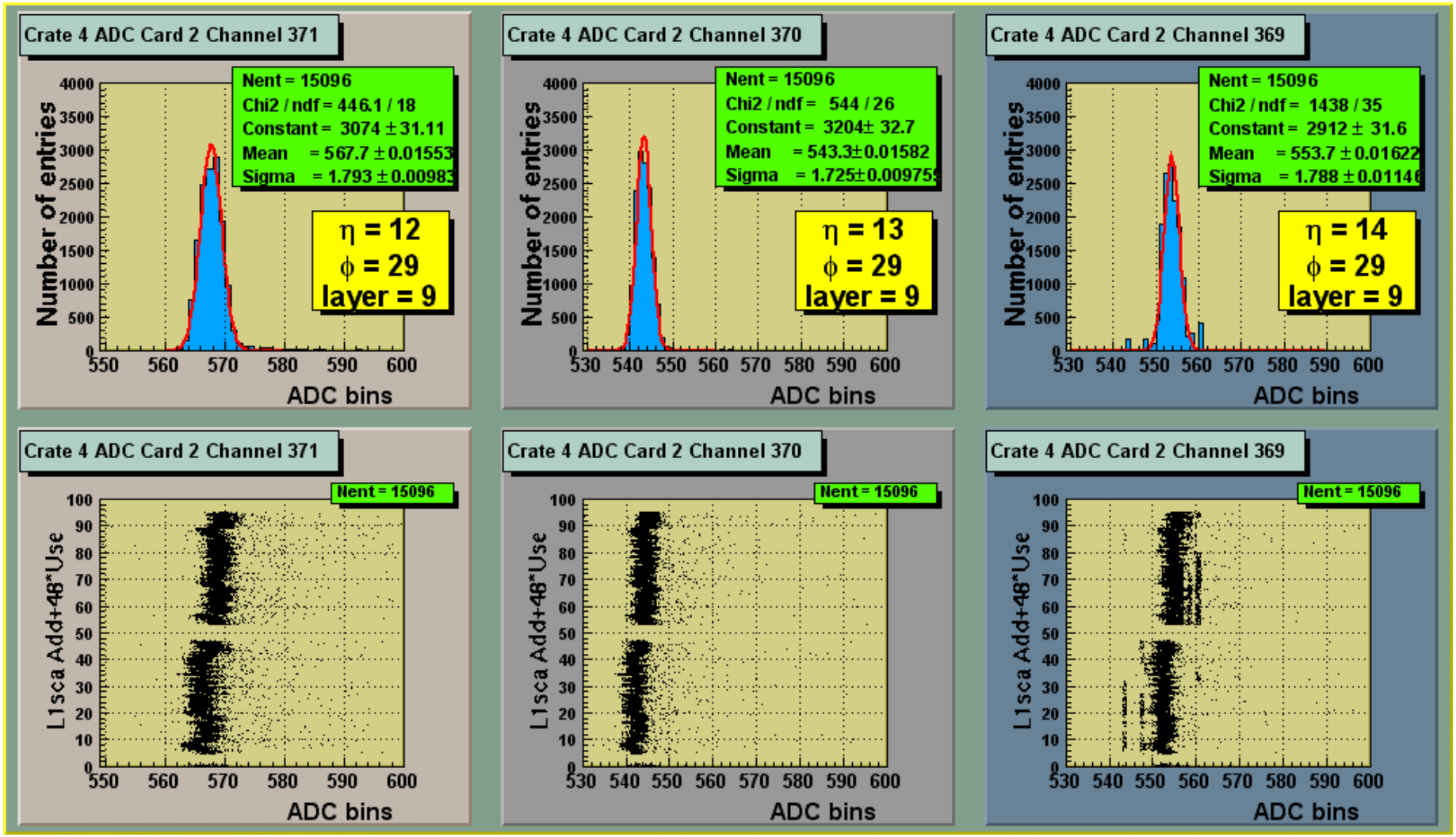


- First sign of split-peak feature …

Calorimeter Commissioning

ICD channels with normal SCA behavior

Zero-bias Data

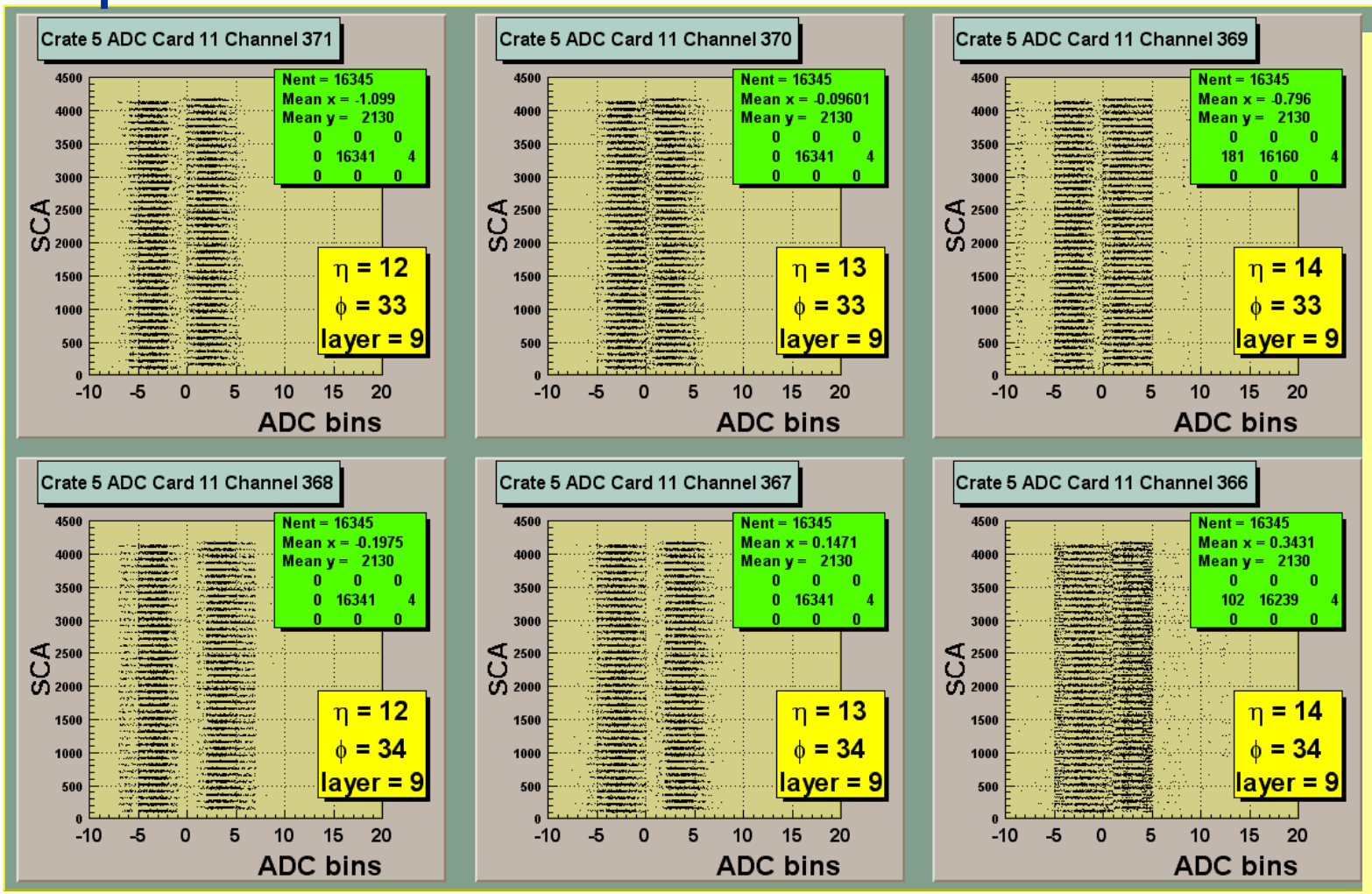


- Switched Capacitor Arrays: Up or Down (Read/Write)

Calorimeter Commissioning

- Up/Down Difference Found in 1/3rd Cal Channels!

Zero-bias Data



Dean S.: "Changed T&C fpga code to wait longer for the signal to settle during READOUT and to be EXACTLY the same timing for both up and down chips."

- Replaced "VERY Slow" SCA chips (about 1% of the "good" SCAs).
- Added caps to make SCA chip ref Voltages less susceptible to other MB signals.

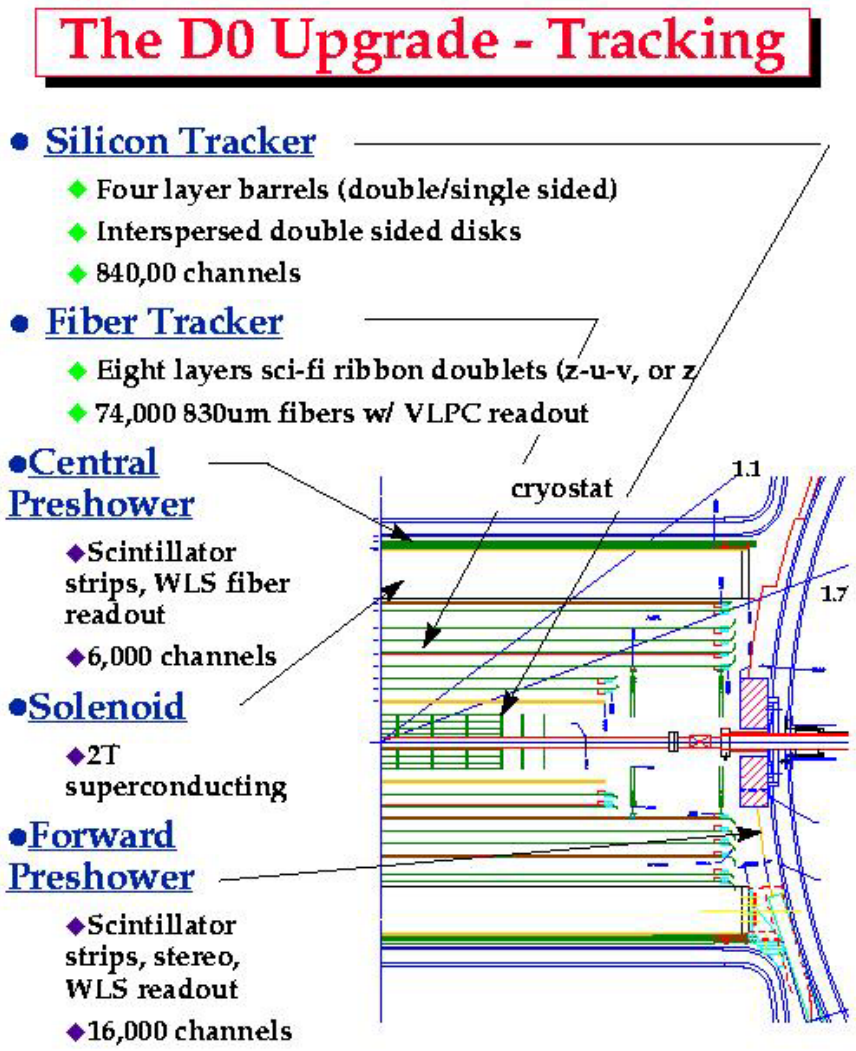
History of ICD: Run 1 vs Run 2

Run 1 → **UTA**
Andy White (prof),
Lee Sawyer (postdoc)
→ Run 2 → **UTA**
Andy White
Kaushik De
Mark Sosebee
et al.

- **Reuse & Recycle: Cost factor behind redesign**
  - Hamamatsu PMTs ➔ 10+ years old by Run 2 *(past spec)*
  - Signal cables ➔ 26-line twist & flat
    - Cal. BLS merge end fixed - cannot reconnectorize
  - High voltage crates
- **Shielding from magnetic field due to solenoid**
  - PMTs cannot operate in kiloGauss plus field
    - Position PMTs to region of reduced field (100-300 Gauss)
- **Fiber tracker & SMT cabling**
  - Reduced η coverage of ICD - use more forward region
- **Complete redesign of readout electronics**
  - Compatibility with Calorimeter BLS system
  - Conform to range of digitizing electronics (ADC)
  - Modular design of electronics drawers

Louisiana Tech
Lee Sawyer
Dick Greenwood
Kathleen Johnston
Alan Stone
Prabir Roy
Ben Williams
Qun Yu
Karen Petrosyan

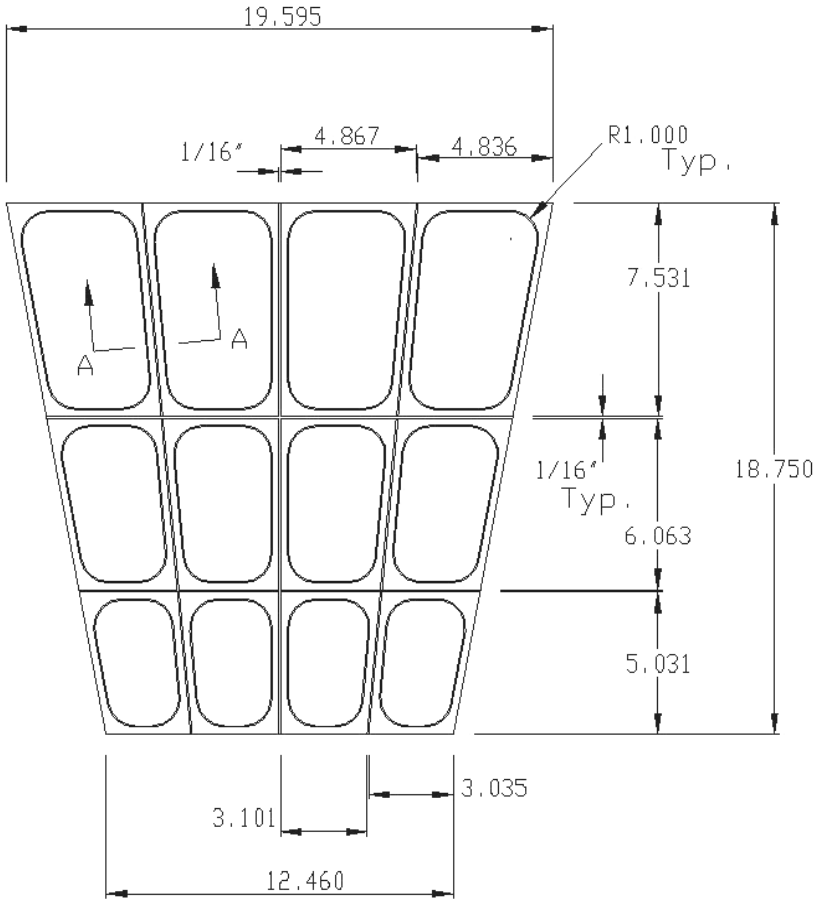
D0 Run 2 Upgrade



- Inner Tracking & 2T Superconducting Solenoid
  - Silicon Micro-Tracker
  - Central Fiber Tracker
- Preshowers
- Pipelined 3-Level Trigger
- Faster Calorimeter Electronics
- Muon detector with better μ-ID
- Modifed ICD

Inter-Cryostat Detector

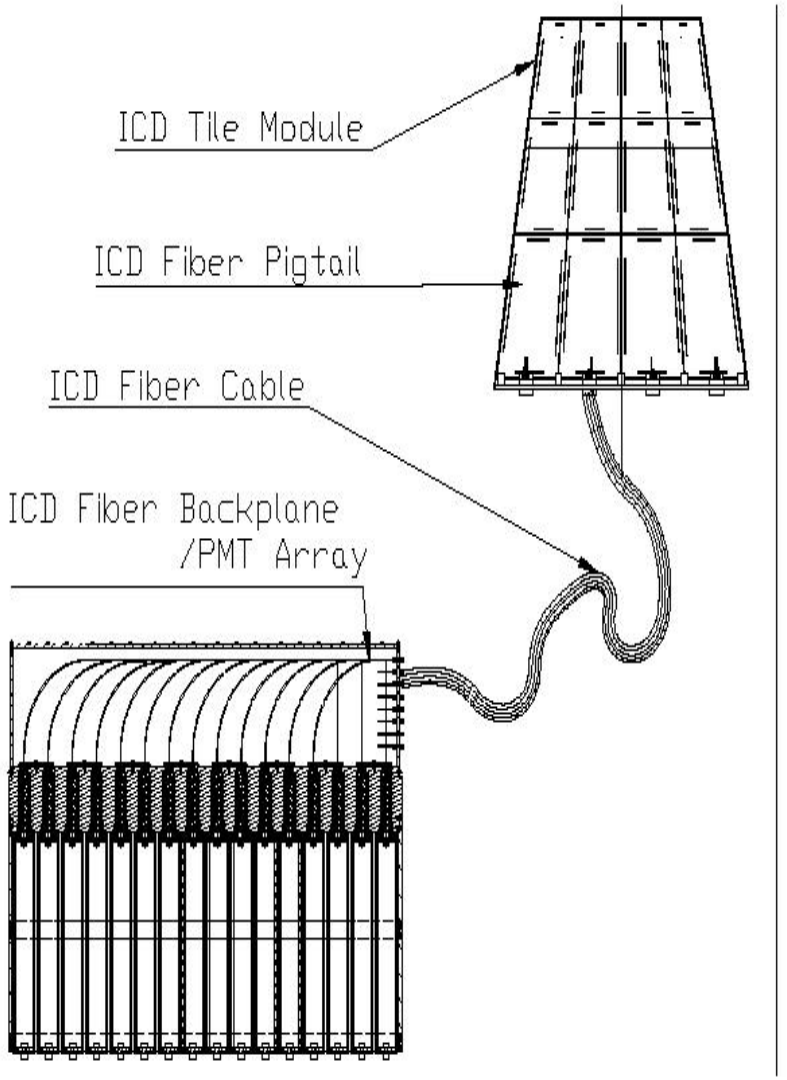
- 16 modules on each EC face
  - .5 in. type Bicron BC400 - PVT
  - att. length (250 cm) >> tile (20 cm)
  - emission spectrum peak at 423 nm
- 12 Scintillating tiles/module
  - η x φ= 0.1 x 0.1
    - ieta = 12,13,14 & iphi = 1-64
  - Isolation grooves - white epoxy to optically isolate tiles
  - Wavelength shifting fibers
    - Converts scintillation light to photons less likely to be absorbed in subsequent light path



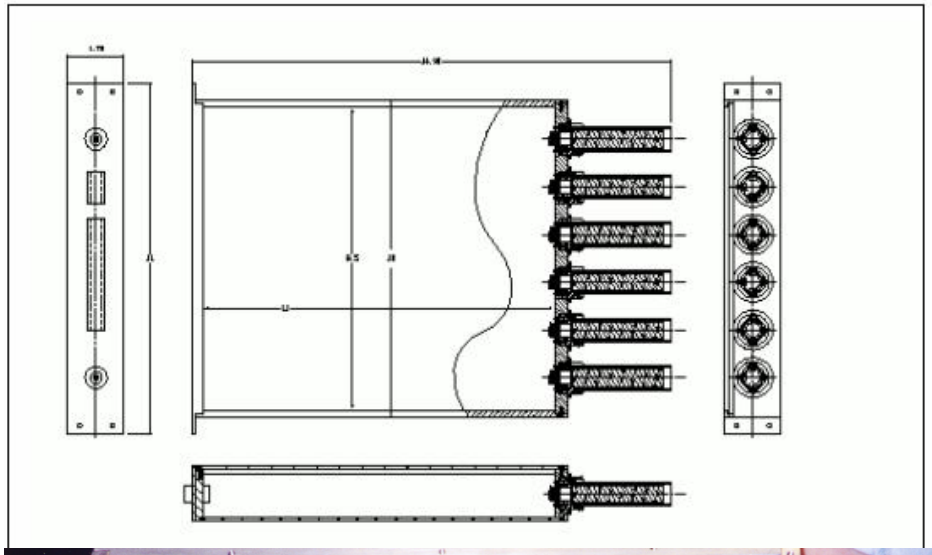
- Tile module arrays enclosed in Aluminum box rubber strip - flexible mounting to soldered pins
  - Symmetric in phi about beam pipe - aligned with FPS
  - Gap for solenoid chimney - 15 full and one half-tile on ECS

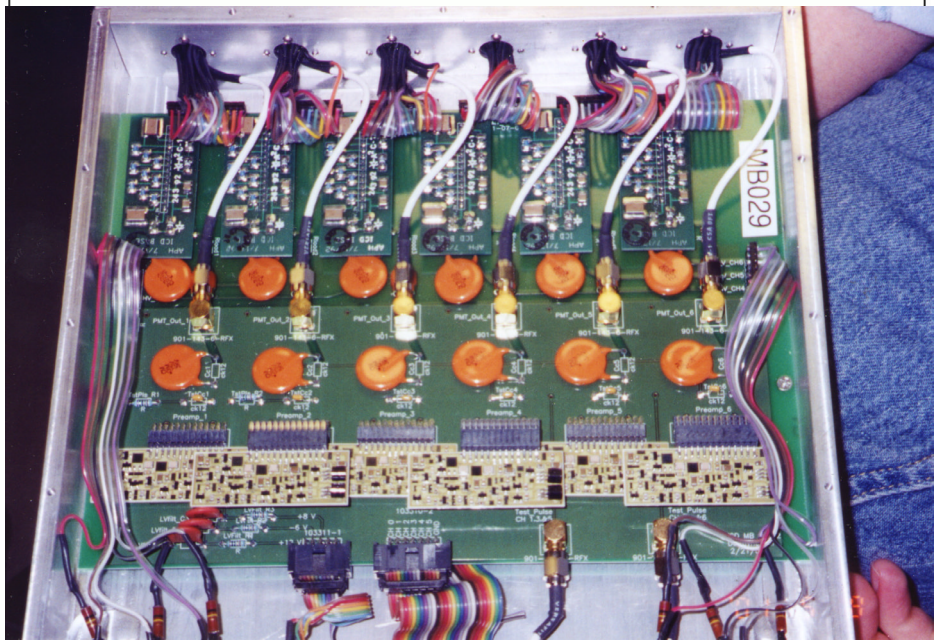
Inter-Cryostat Detector

- Clear fiber cables transports light from tile to fiber backplane
  - 5m length - diamond polished ends
  - sheathed rigid bundles of 9 fibers
- 4 ICD crates: NE,NW,SE & SW Quadrants
  - Iron blocks w/96 PMT "holes"
  - fiber backplane - distributes light signals from fiber ribbon cables originating from tiles to the photomultiplier tubes
  - three 1.1 mm fibers & one LED fiber routed through "cookie" which fixes end of fibers in correct location w.r.t photocathode of PMT



Electronics Drawer

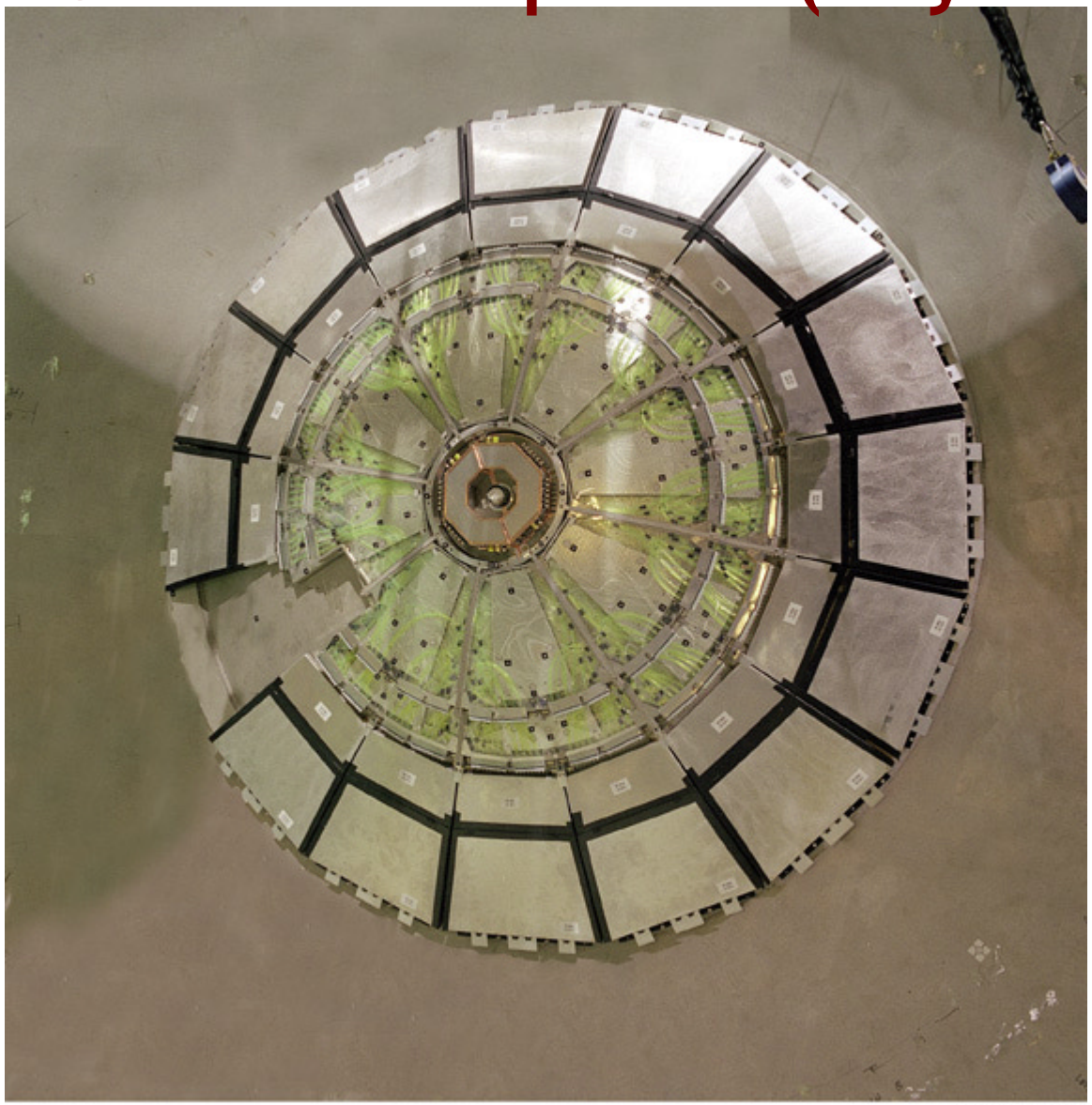


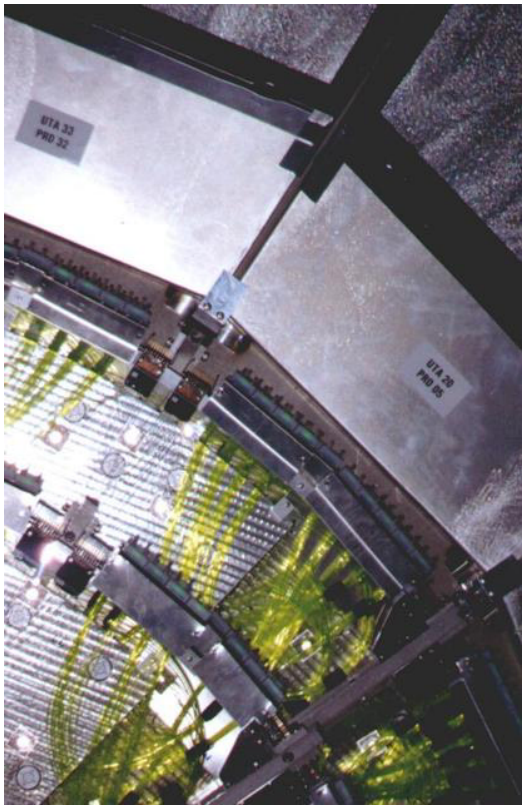


Designed, Built & Tested at Louisiana Tech

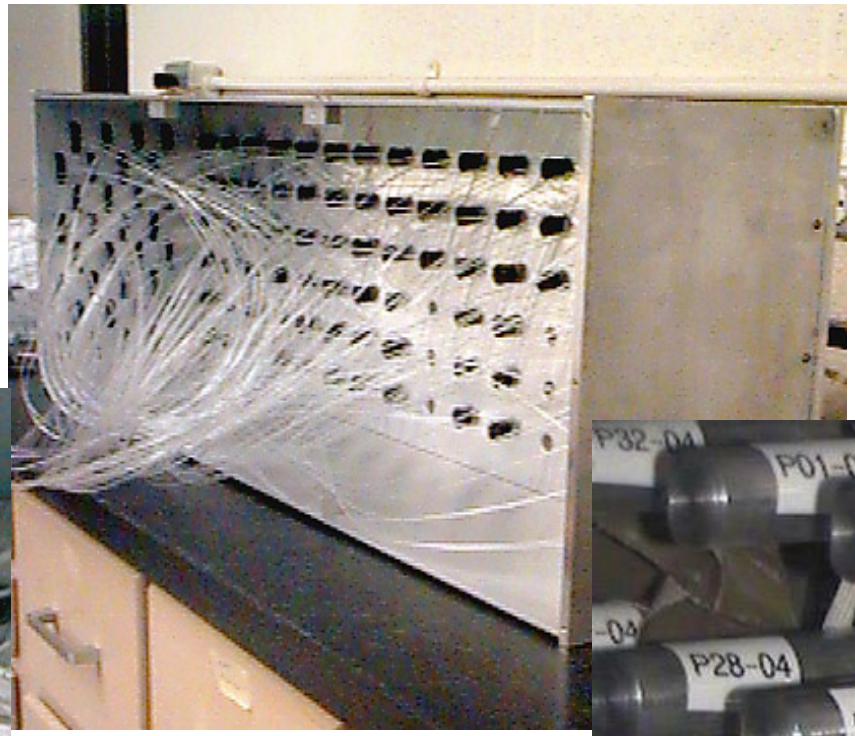
- 378 Hamamatsu R647 photomultiplier tubes housed in mu-metal shields ➔ protect from 100-300 Gauss fringe fields
  - ➢ ICD design: 10 pe yield at cathode & 200k electrons at anode
- High voltage divider chain achieves lower gain than PMT spec & extends the PMT longevity
- 64 readout electronics drawers of modular design – 6 channels/drawer
- Motherboard, preamps, HV bases, LV & HV inputs, spring-loaded sockets

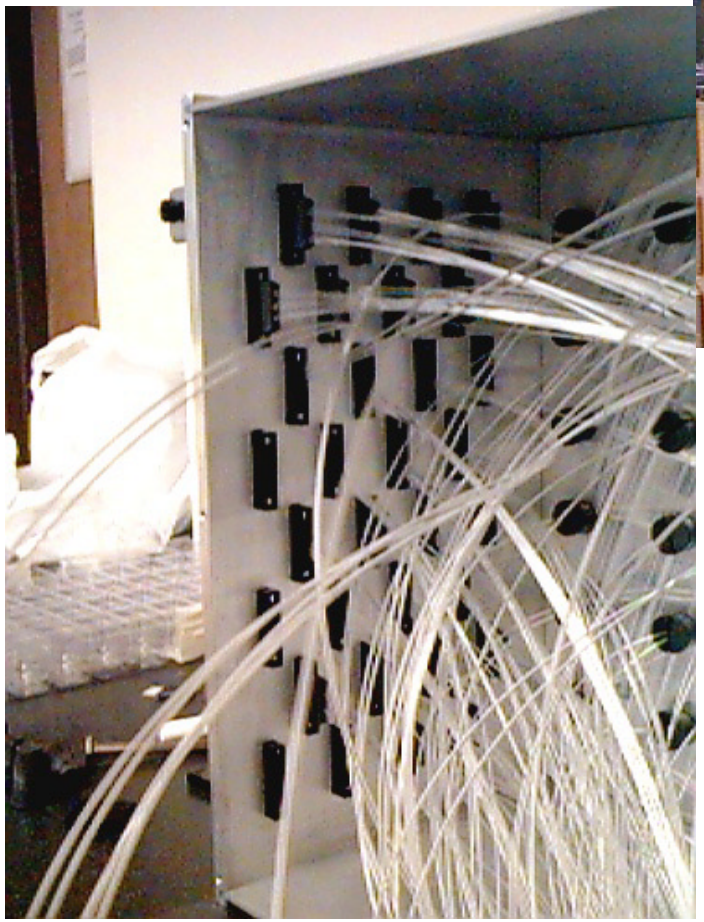
South Endcap Face (May 2000)



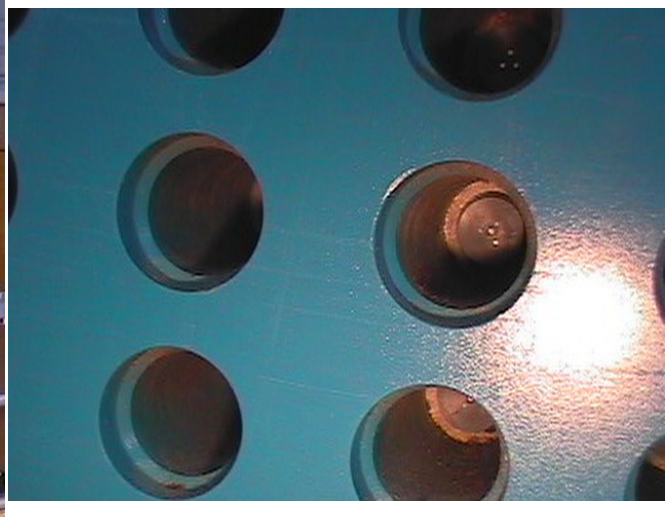


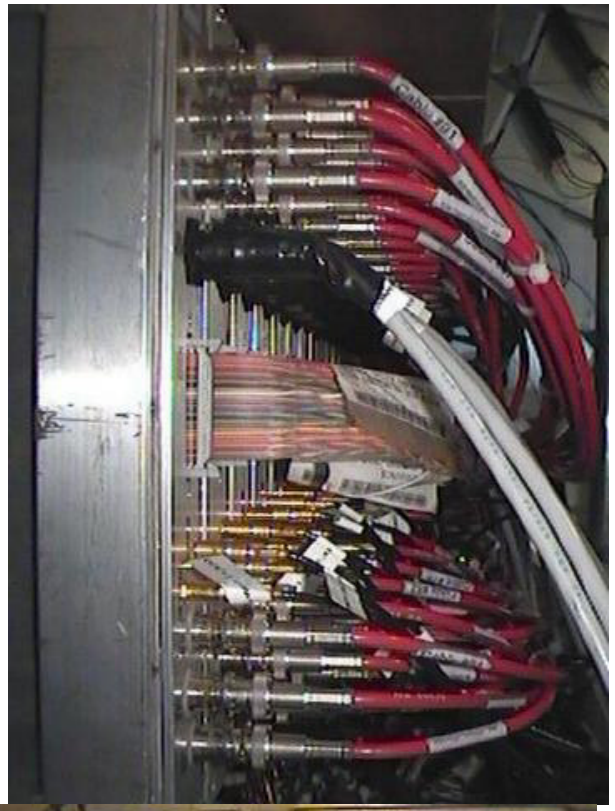
Fiber Backplane

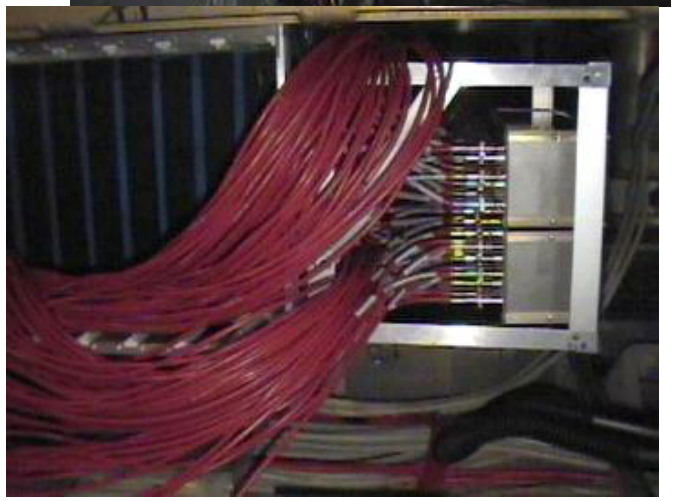




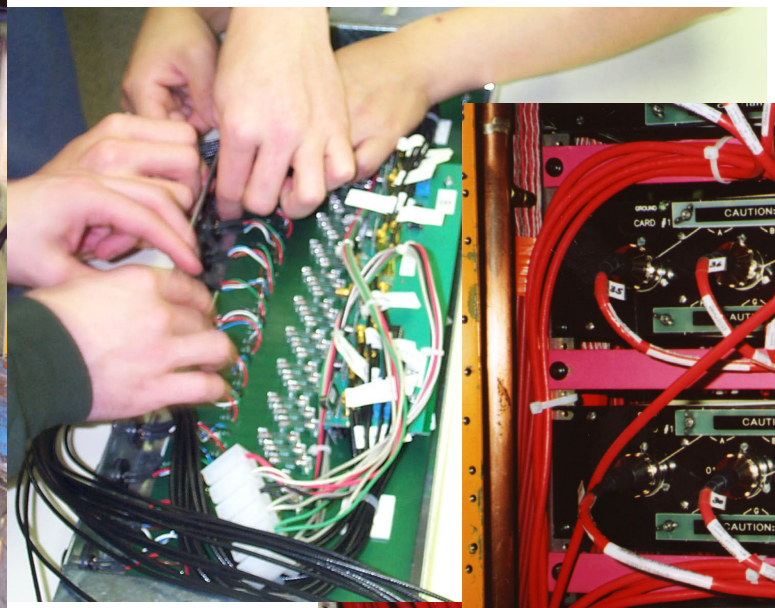
Iron Block & Drawers

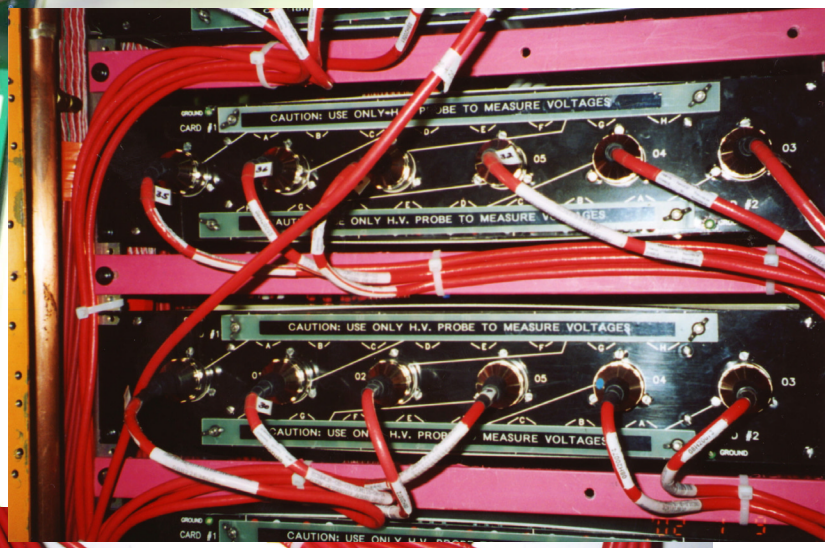


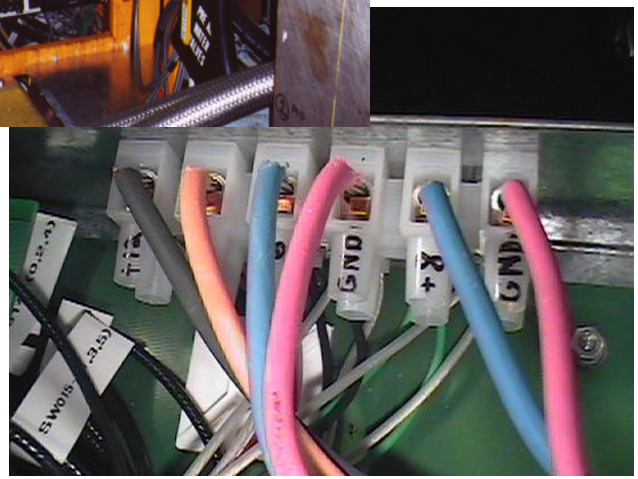




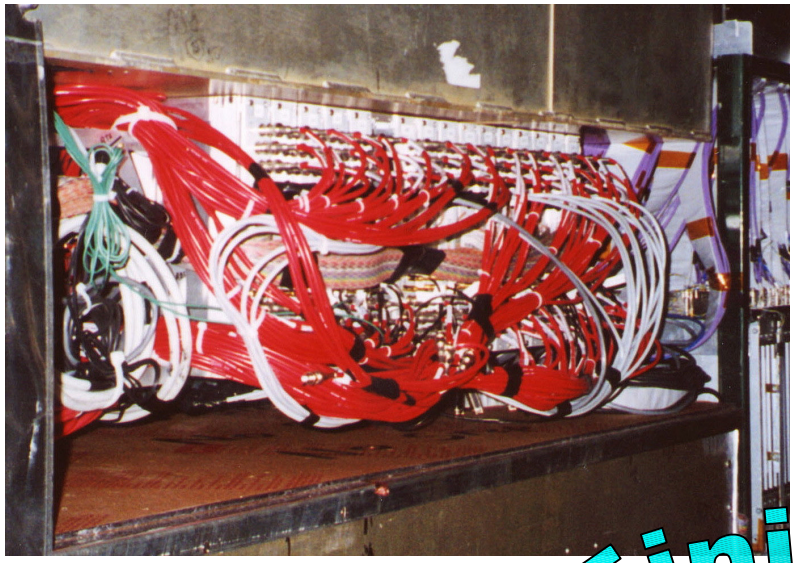
High & Low Voltage

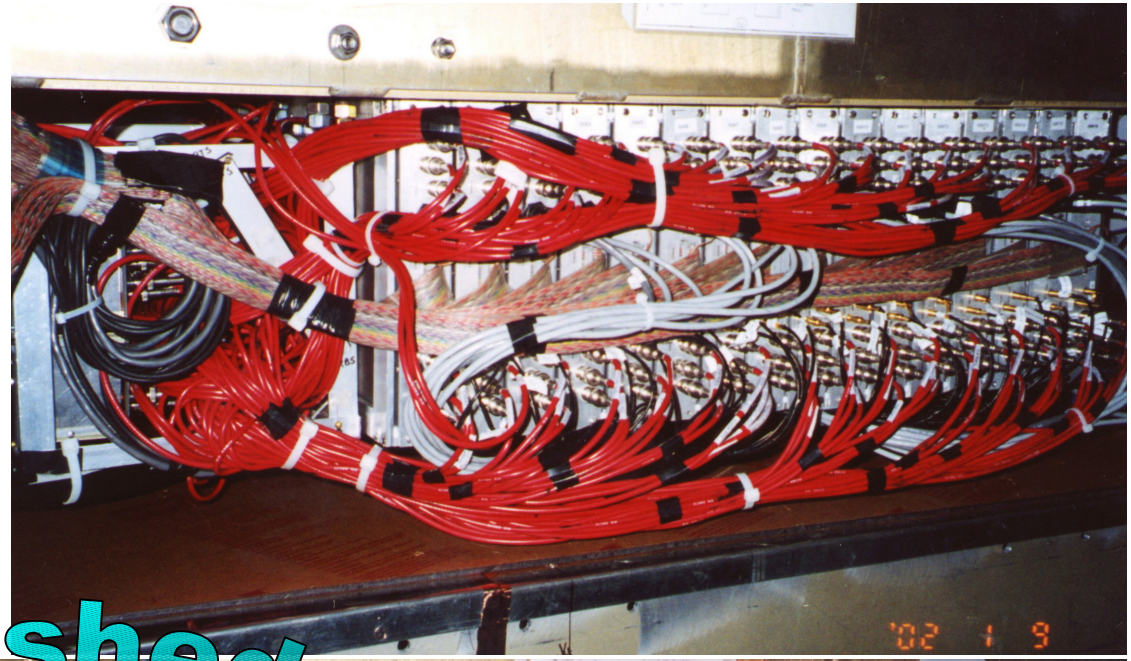




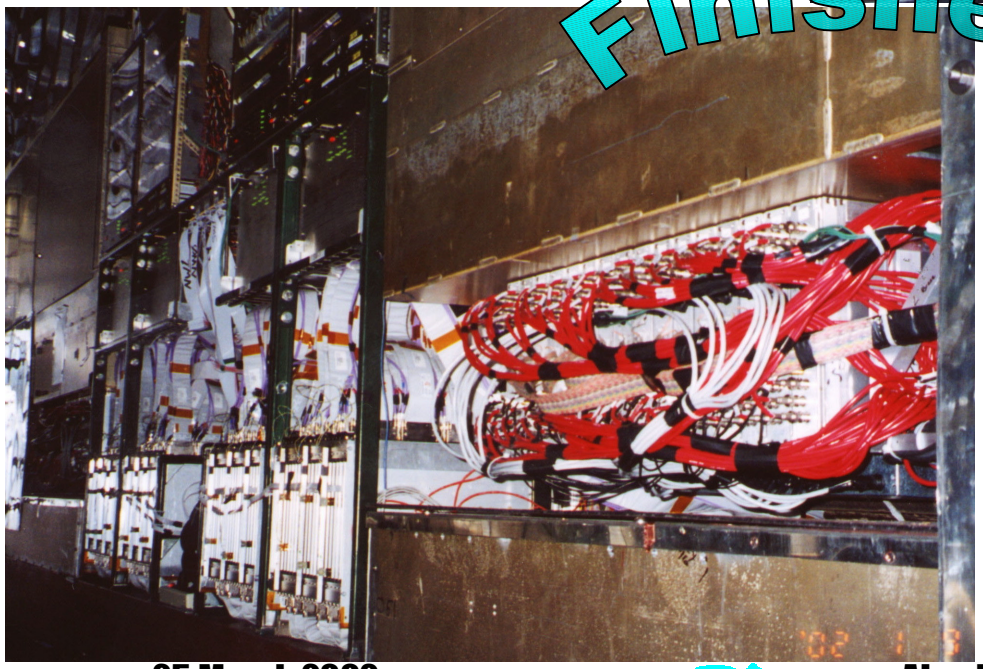


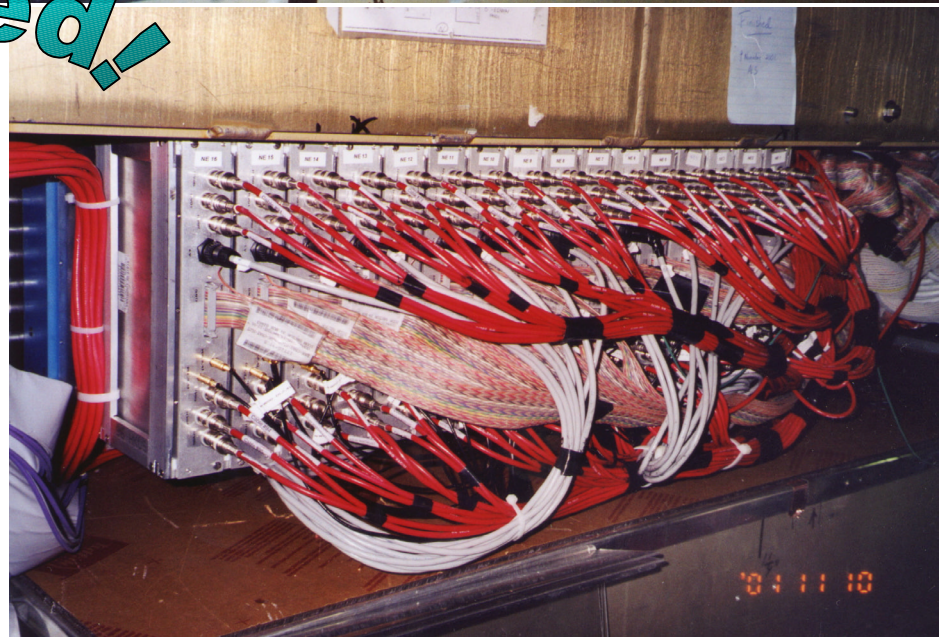
Four ICD Crates





Finished!

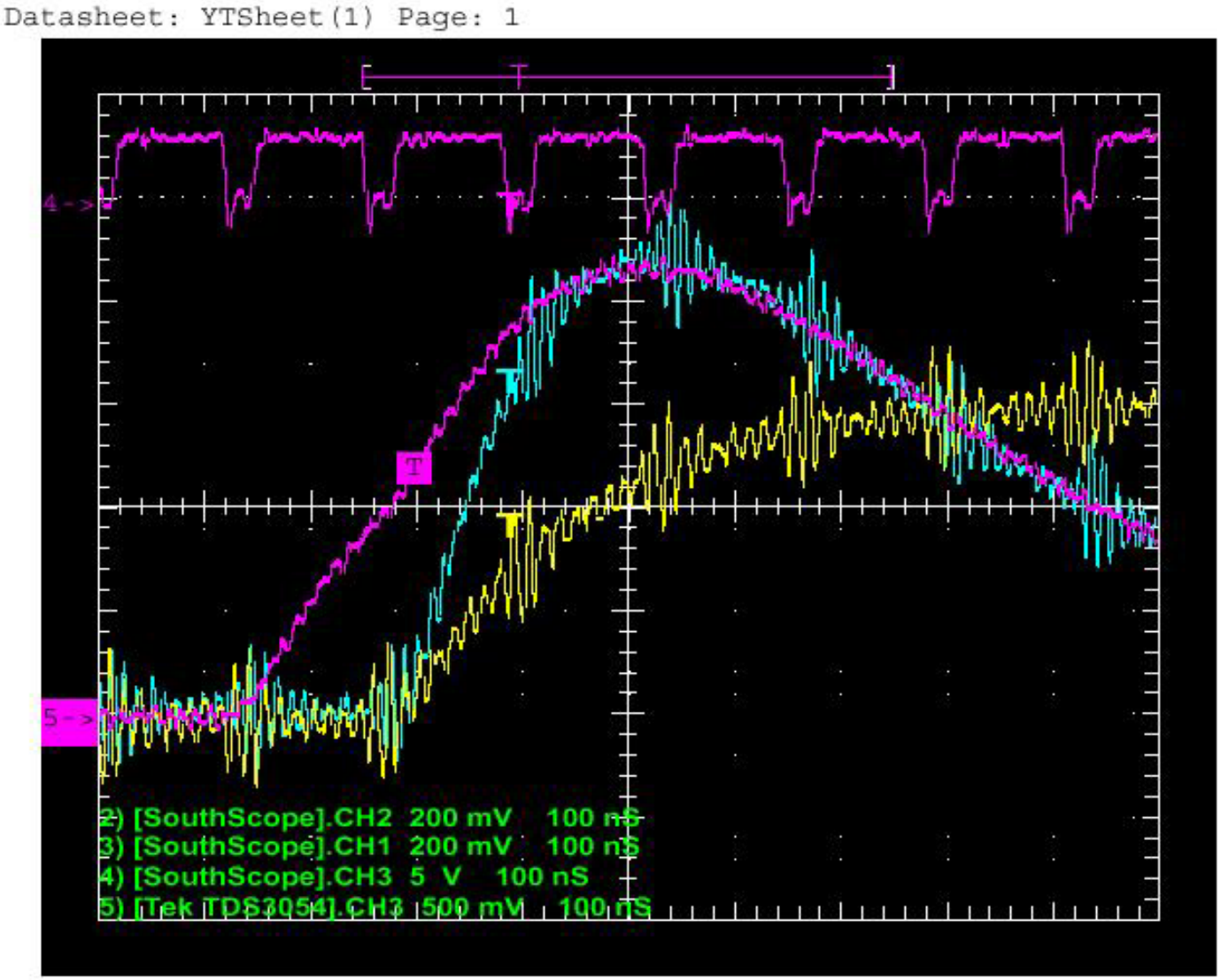




ICD Status Review

- Timing with Respect to the Calorimeter
- ADC to GeV Conversion
- LED Pulser & Calibration
- Monte Carlo Representation
- High Voltage System
- Documentation
- Shift Work
- Maintenance & Repair

ICD-CAL Preamp/BLS Signal Shape



Yellow: ICD preamp signal (integrated charge).

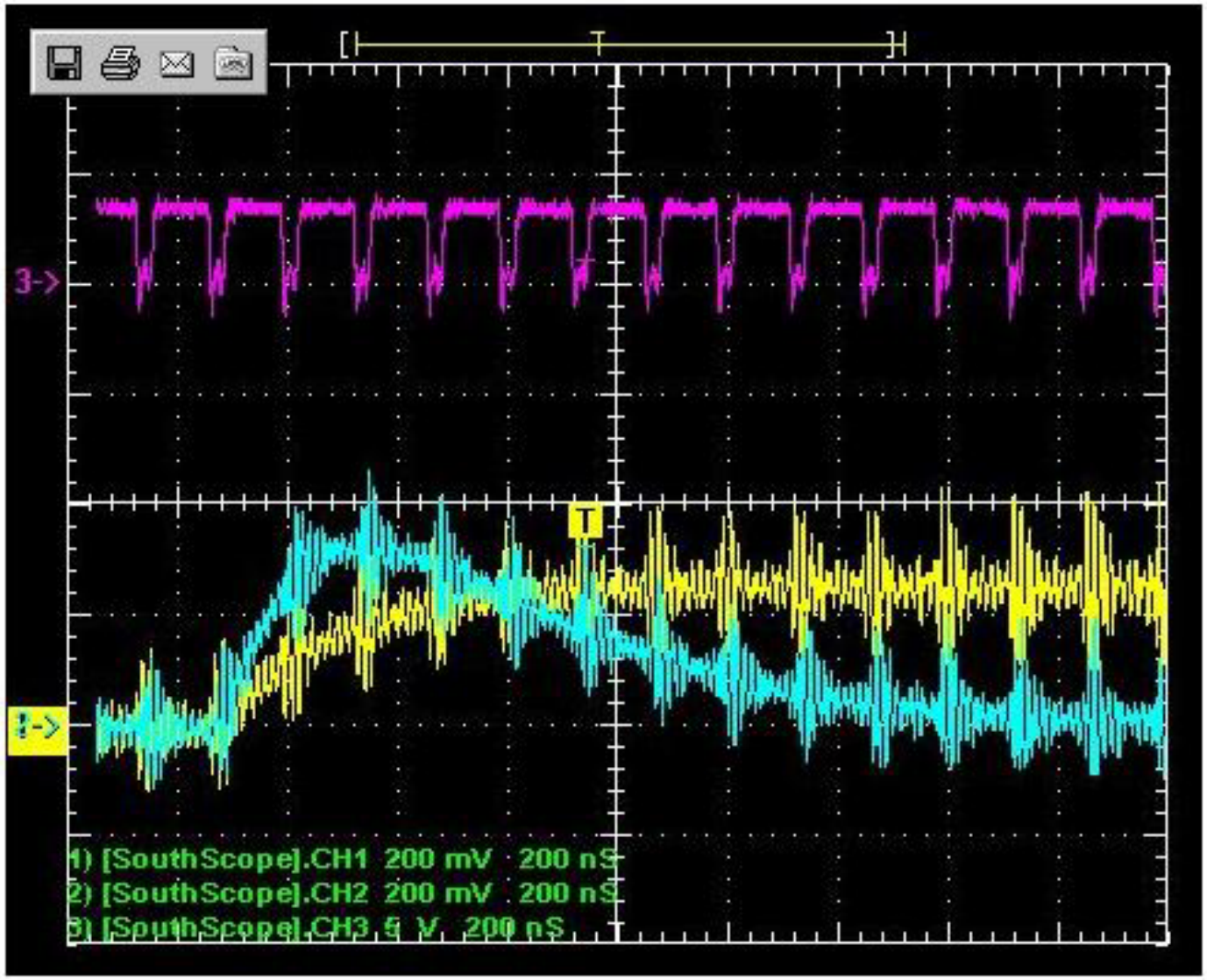
Blue: "shaped" ICD signal from BLS.

Purple: "shaped" calorimeter signal from BLS.

Tick marks (132ns) from Tevatron.

Note: These are preamp pulser signals (not beam).

ICD Beam Signal

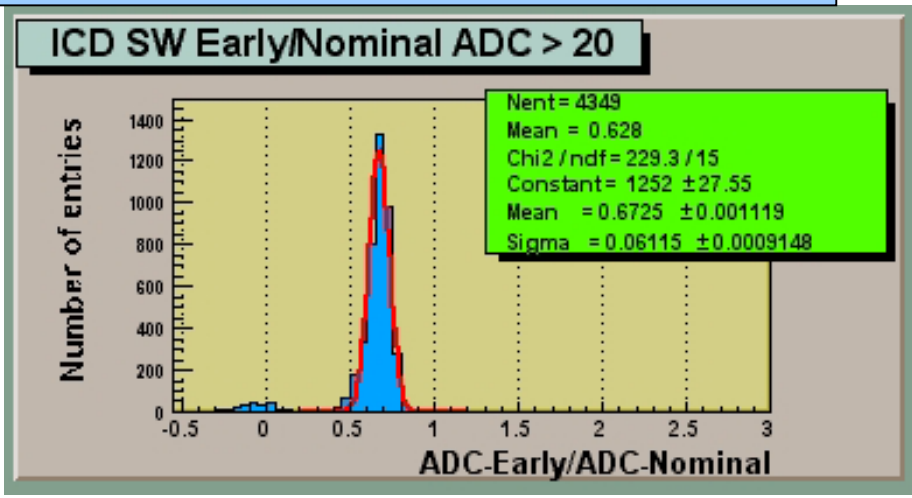


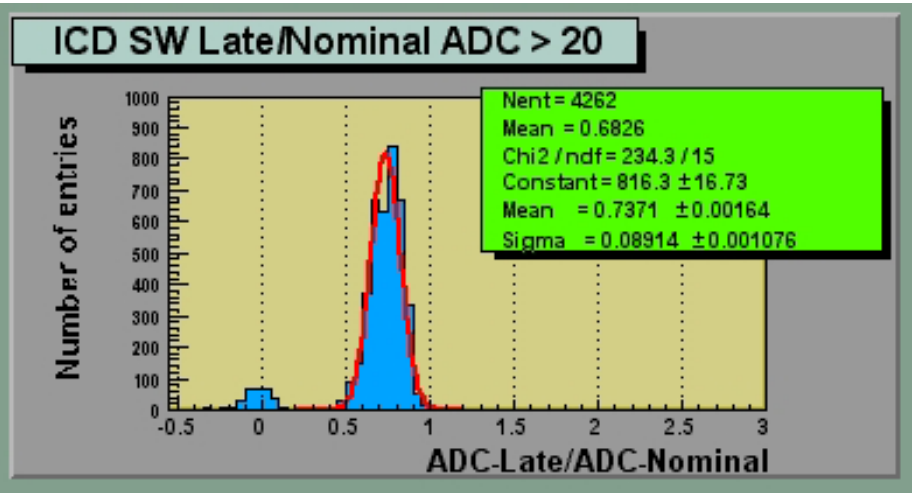
ICD signal is faster than CAL signal (fiber optics). But, both signals are sampled by the BLS system at the same time. As the ICD signal arrives early, it is sampled on the falling edge, beyond the peak value. However, the plateau is fairly "flat" and wide, ~ 200 ns.

ICD Timing Studies

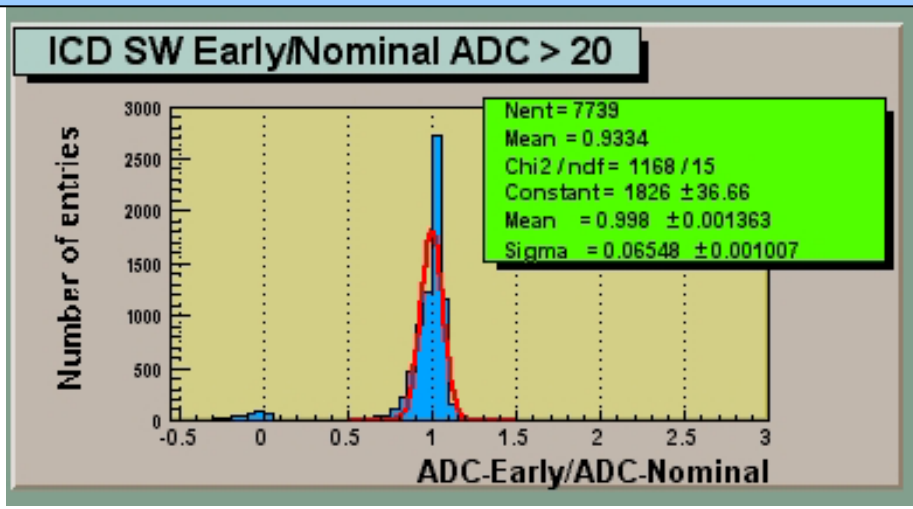
Field Programmable Gate Array: firmware for calorimeter ADCs – modify timing

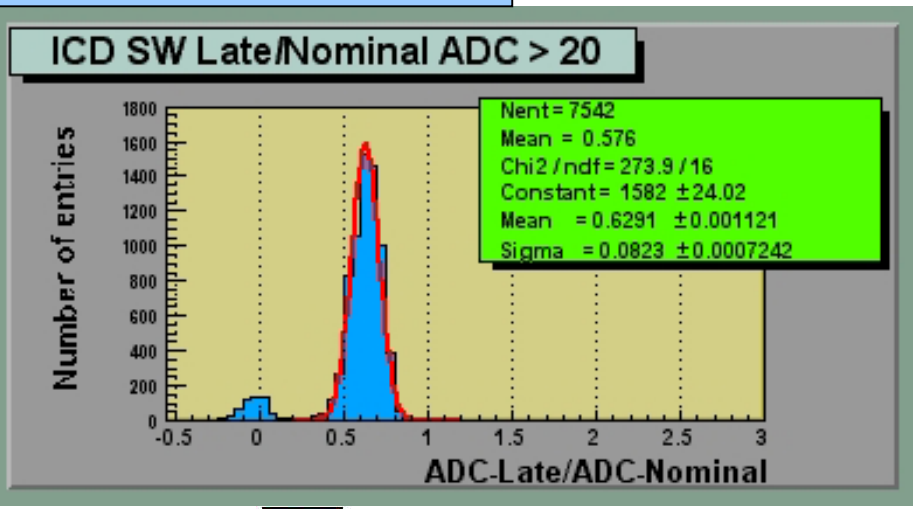
FPGA v17: ICD is sampled very near peak





FPGA v18: ICD is about 1 tick (132 ns) early – sampled on falling edge





Timing Effects

- ICD readout with respect to the Calorimeter
  - Cannot move Calorimeter timing for benefit of the ICD readout (<400 vs >55,000 channels)
- ICD signal arrives about 132 ns early to BLS
  - Signal is sampled towards falling edge
    - But less than 10% effect
- Decision
  - Add 60-90 feet to EACH signal cable
    - Required snipping & reconnectorizing (very risky!)
    - then burying excess cable (very tight spaces!)

OR

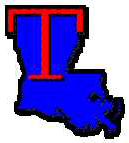
  - Absorb into energy scale/weight/calibration ✓

ADC to GeV Conversion

- Specific energy loss (dE/dx) in the Bicron BC-400 scintillator (PVT)

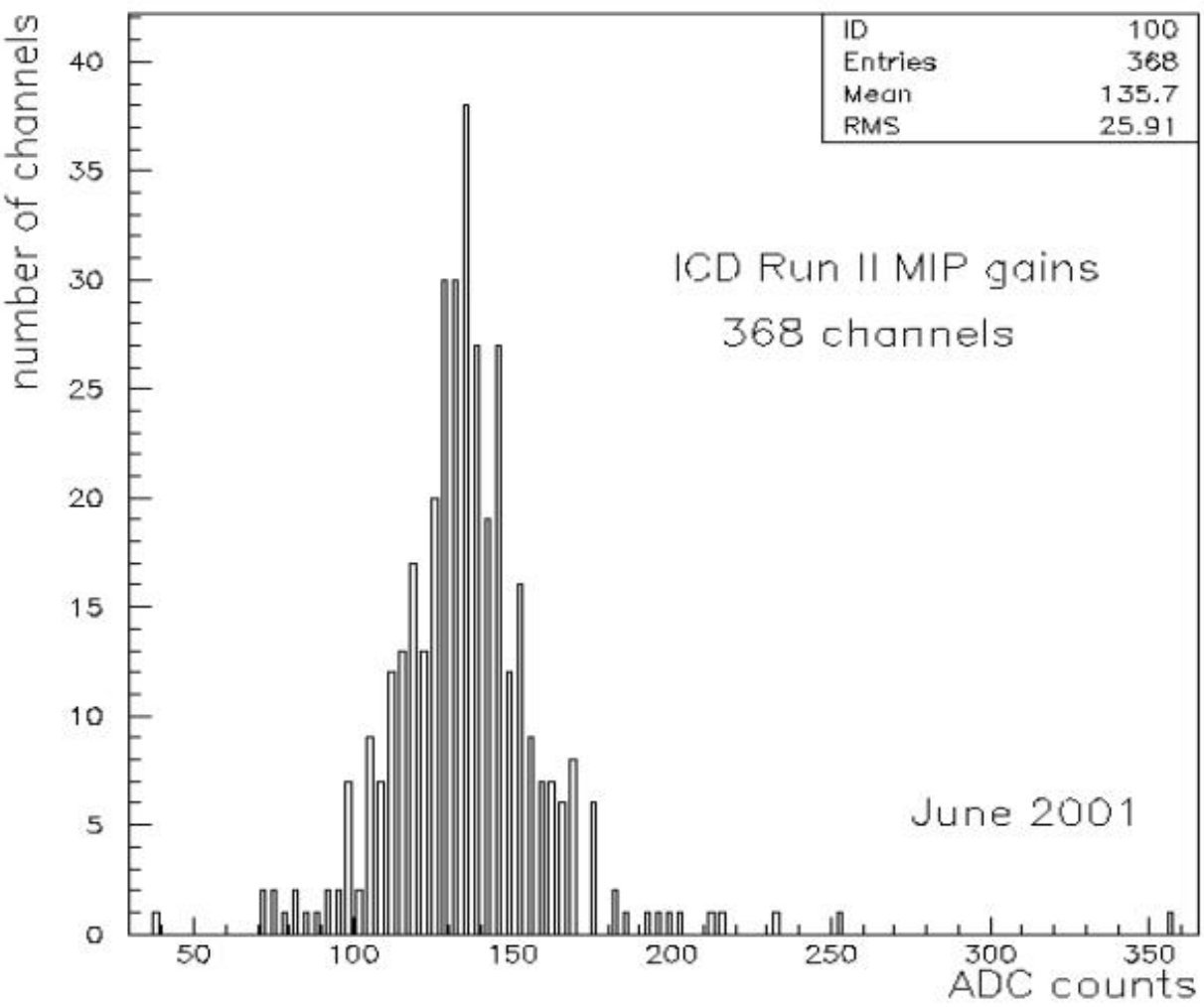
  $dE/dx_{min} = 1.956(g/cm^2) \times 1.032\ g/cm^3 = 2.02\ MeV/cm$

- Mean MIP peak in test stand ADC counts for 368 channels was 135.7 (aim was 140!)
- Relative gain factor between calorimeter preamps (used on the test stand) and the ICD preamps was 3.8.
- Extra amplication of 8.7 used to boost signal on test stand
- Factor of 10 between least count of test stand ADCs & the calorimeter ADCs. Least count for test stand (calorimeter) ADC is 1 (0.1) mV.



ICD tiles - test stand results

compiled by Mark Sosebee



Characterization of scintillator tiles, fiber cables and PMTs. We assumed uniform electronics. to push the signal significantly above pedestal, we used calorimeter preamps throughout testing.

ADC to GeV Conversion

- The *cosine* factor accounts for angle from normal to an ICD tile relative to a straight line drawn from the IP through the center of a tile. There are three numbers, one for each ieta bin spanned by the ICD:

ieta	cosine factor
12	0.592
13	0.633
14	0.671

Caution: Sampling fractions also contain this angular correction .

- Thickness of all ICD tiles are 0.5 in (about 1.27 cm).

ADC to GeV Conversion

- Average MIP peak position in calorimeter ADC counts is given by:

  $(135.7 \times 10) / (3.8 \times 8.7) = 41.0$ counts

- Energy deposition in an ICD tile is given by:

  (Cal. ADC count / 41.0) $\times$ (2.02 MeV/cm $\times$ 1.27 cm)

- The result: (Cal. ADC count $\times$ 0.06257) [MeV]

$$= \text{(Cal. ADC count / 15982) [GeV]}$$

Basics of the ICD LED Pulser

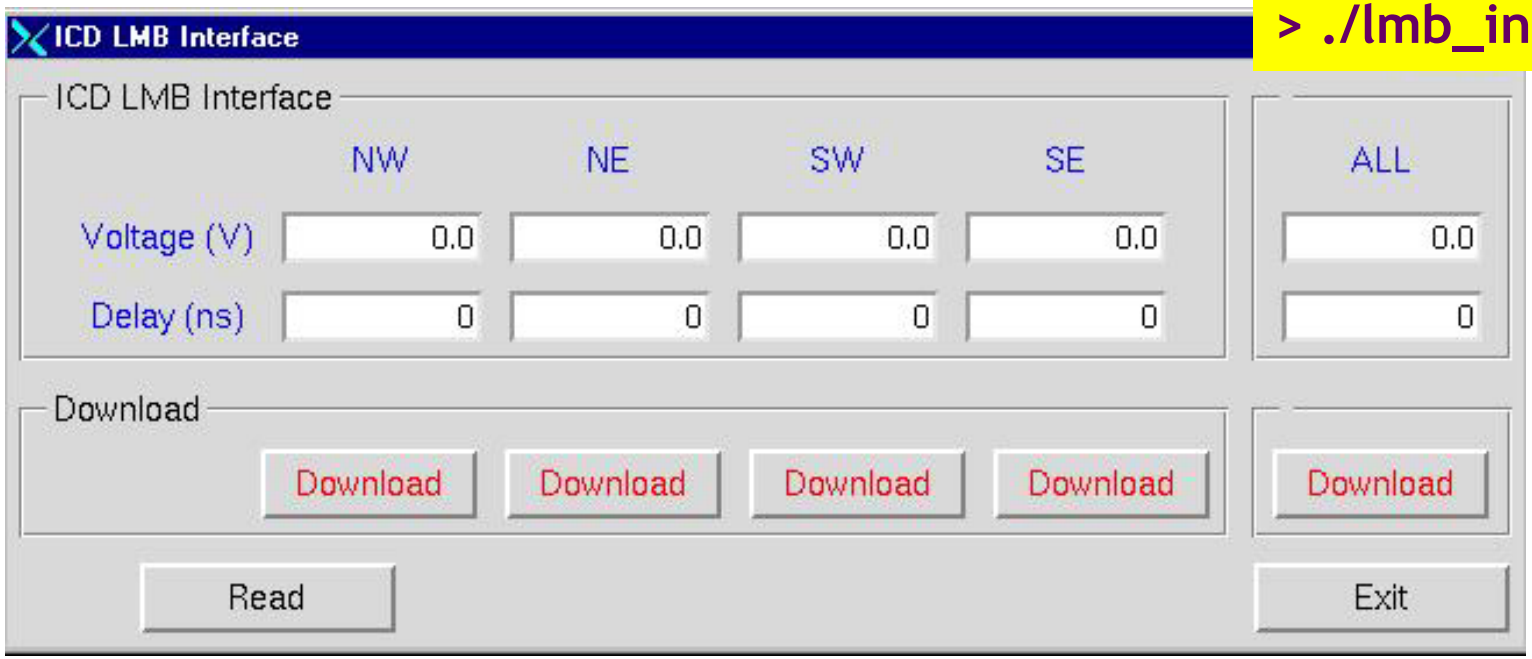
- Scintillator LED Pulser (SLP) – *borrowed* from the Muon calibration system
  - ICD shares VME board with FPD – sits in MCH308
  - Accepts external NIM test pulse trigger
  - VME controlled channel enable, trigger, amplitude and delay
    - Steve Doulas (Northeastern) provided docs & expertise!
    - Excellent GUI created by Marc Hohlfeld (Univ. Mainz – Germany)
  - DC offset resistively coupled to a TTL signal pulse
    - TTL pulse triggers a transistor which discharges a capacitor into a group of four LEDs
    - DC offset provides the bias voltage for these LEDs
  - Pin Diode readout pending
    - FPD group waiting on AFE boards

Purpose of LED

- Initially: Is it alive?
  - Test: Electronics, cables, LV, HV, signal, BLS
- Long term monitoring of PMT response
  - The photomultiplier tubes for the Run II ICD sub-detector were *recycled* from the Run I ICD boxes
  - Each channel was individually *tuned* in order to achieve a mean MIP peak on the cosmic ray test stand
    - Only lever arm is the high voltage setting
  - Over a dozen PMTs have already been replaced
    - About a dozen channels have failed or dropped significantly in gain since the end of the Oct-Nov 2001 shutdown
  - Establish a real world baseline for the full ICD - from scintillator tile to the BLS card
    - Determine correction for channel to channel variation

Taking LED Pulser Runs

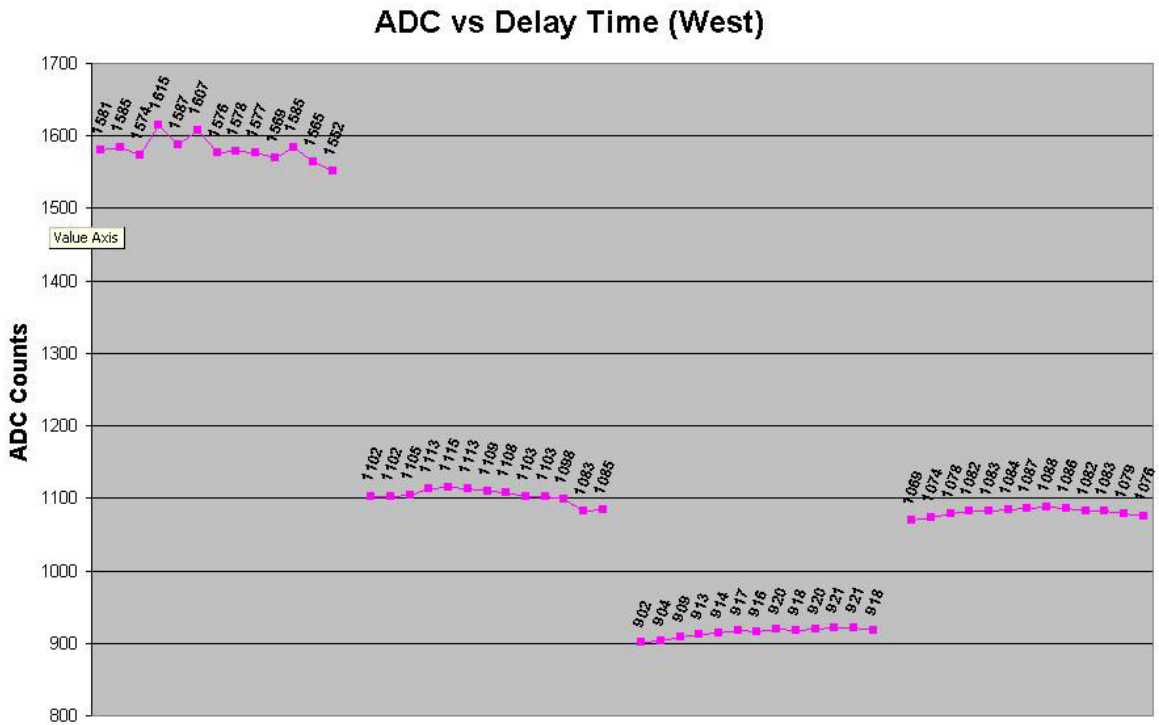
```
> setup d0online
> cd /home/d0icd/vme
> ./lmb_int.py &
```

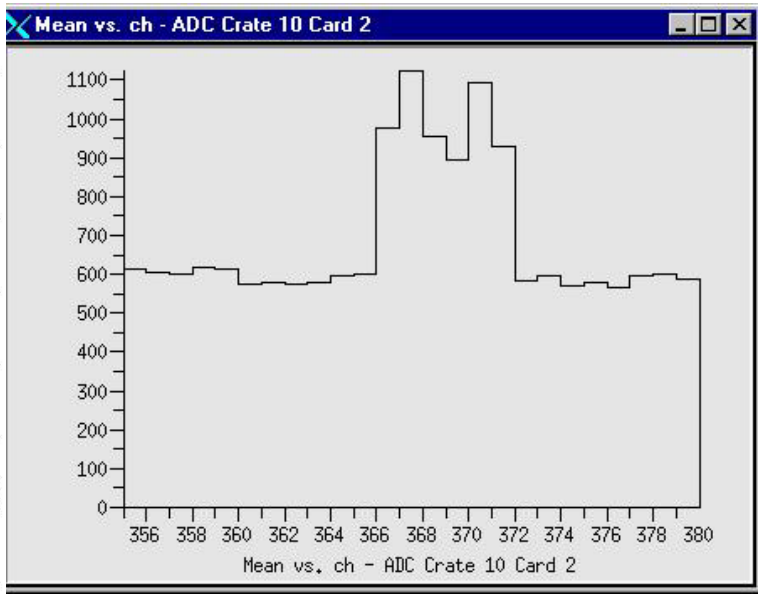


- Part of the Calorimeter Shifters' Guide & Instructions
- Voltage is adjustable up to 10.0 Volts in increments of 0.2 V
- Delay is adjustable from 0 to 170 ns in increments of 2 ns
- Optimization: Settings (delay/DC offset), Procedure, Schedule

LED Pulser Studies

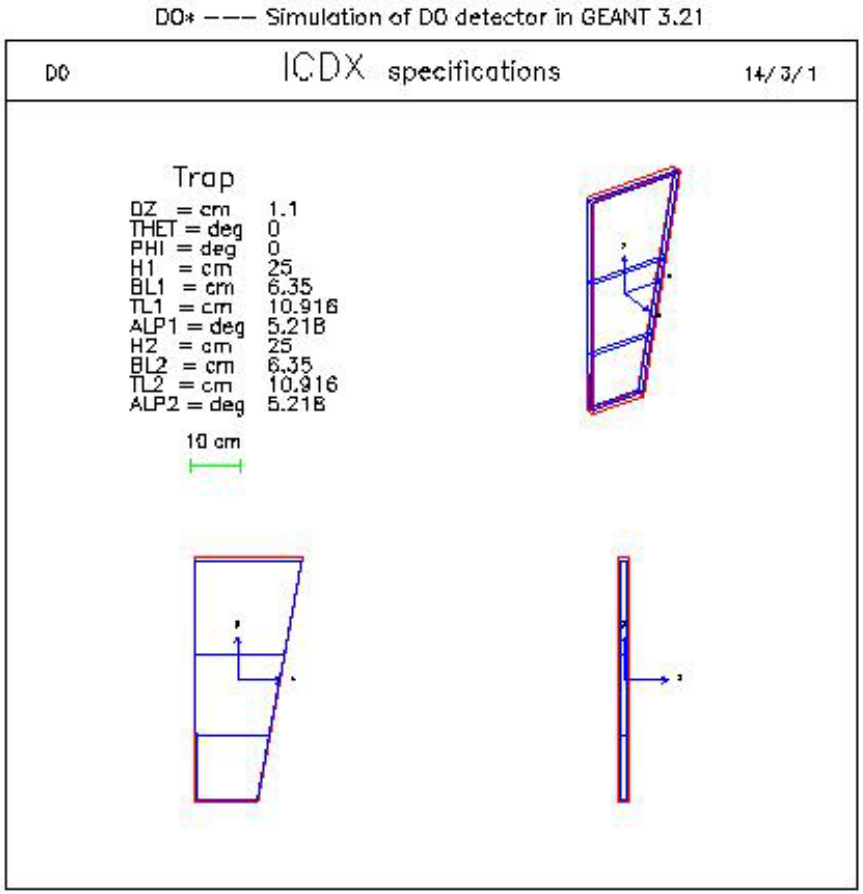
- Scan delay times for fixed DC offset (8.6V)
  - 10-130 ns: optimization about 60-80 ns delay
- Single channel from four Calorimeter readout crates which contains ICD (West)

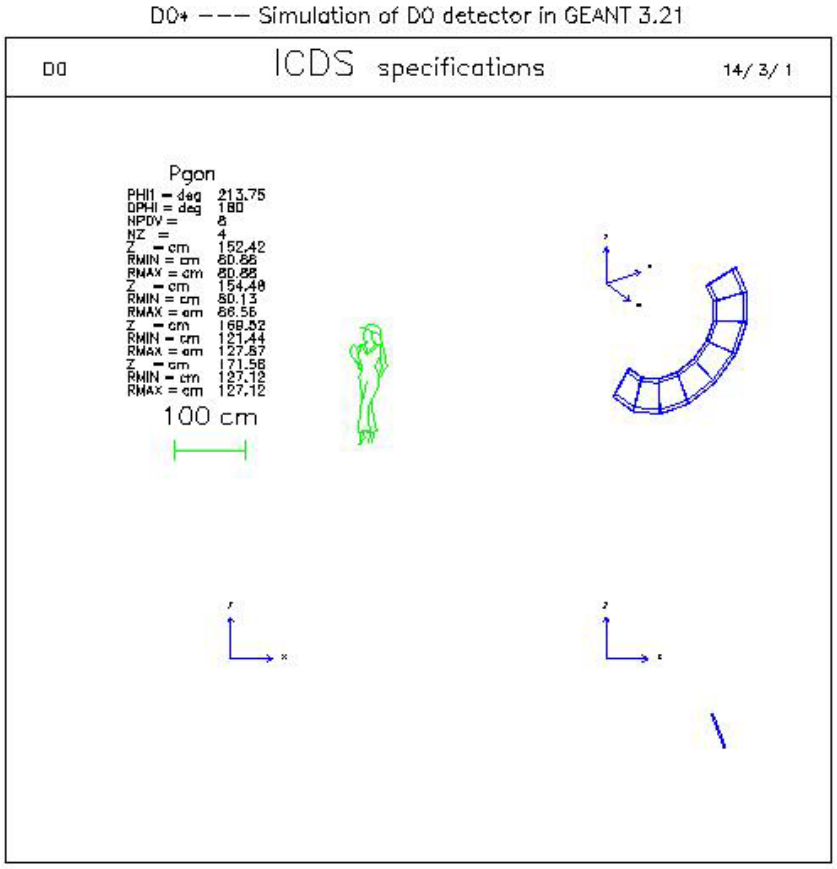




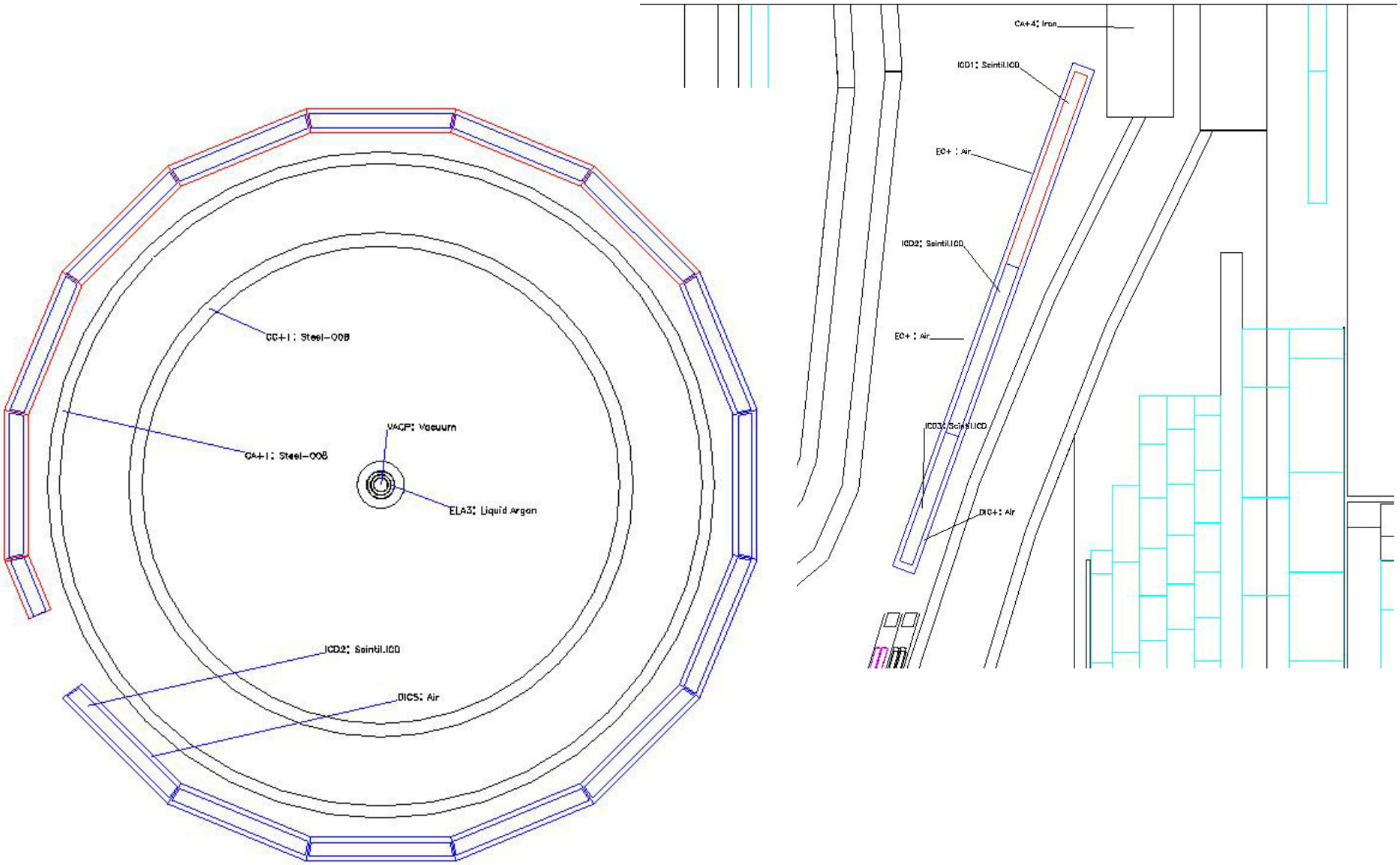
ICD Monte Carlo Representation

- Trapezoidal shapes - three eta segments
- Ring of 16 trapezoids form truncated hollow cone





x-y & x-z View of ICD

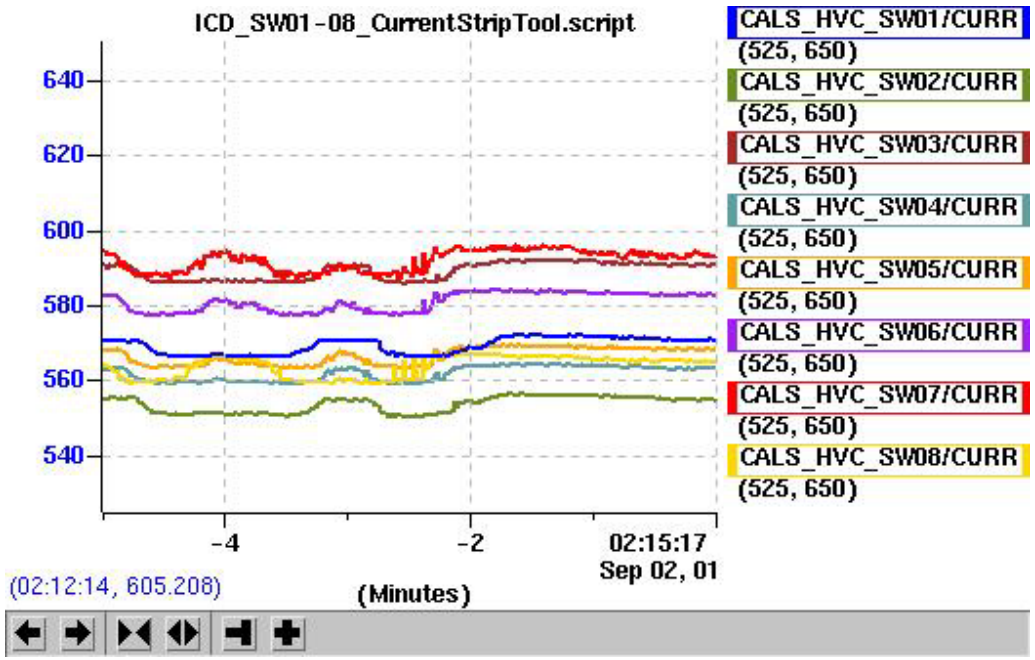


ICD High Voltage System

- High Voltage modules in moveable counting house
  - 800 Volts, 900 μAmps
  - 128 SHV patch cables
    - Stone, Sawyer, Williams
- Reuse Run I Reynolds cables
  - Locate & reroute through cable winders & MCH
    - "hands & knees" effort
- 1:3 HV fanout boxes

  (space & money constraint)
  - Set screws & test points for each output channel
  - Each channel (of 378) tuned to ±1 Volt of characterization

- HV Monitor GUI *(next slide)*
  - Voltage & current readback
    - Limits & alarms
- StripTools



ICD HV Monitoring GUI

File View Set HV Plot Mode Help

ICD North-East | ICD North-West | ICD South-East | ICD South-West

Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State	Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State
SW01	1012	1100	735	735.0	734.8	735.6	Locked	SW02	1011	1100	735	735.0	734.7	720.3	Locked
SW03	1012	1100	746	746.0	745.7	745.4	Locked	SW04	1013	1100	763	763.0	763.2	733.6	Locked
SW05	1012	1100	752	752.0	752.2	743.0	Locked	SW06	1011	1100	762	762.0	762.3	763.5	Locked
SW07	1011	1100	780	780.0	780.5	785.6	Locked	SW08	1012	1100	760	760.0	760.5	745.4	Locked
SW09	1012	1100	755	755.0	755.3	768.5	Locked	SW10	1013	1100	755	755.0	755.4	755.6	Locked
SW11	1012	1100	780	780.0	780.1	789.7	Locked	SW12	1013	1100	750	750.0	749.8	756.2	Locked
SW13	1012	1100	790	790.0	790.0	800.5	Locked	SW14	1013	1100	790	790.0	789.8	774.2	Locked
SW15	1014	1100	745	745.0	744.9	755.1	Locked	SW16	1014	1100	765	765.0	765.0	772.8	Locked
SW17	1012	1100	765	765.0	764.7	786.2	Locked	SW18	1011	1100	765	765.0	765.2	766.5	Locked
SW19	1011	1100	763	763.0	762.9	763.3	Locked	SW20	1012	1100	812	812.0	811.9	812.5	Locked
SW21	1015	1100	778	778.0	777.8	791.4	Locked	SW22	1012	1100	768	768.0	768.0	773.0	Locked
SW23	1010	1100	799	799.0	799.0	803.6	Locked	SW24	1014	1100	748	748.0	748.1	740.2	Locked
SW25	1011	1100	807	807.0	807.1	803.8	Locked	SW26	1012	1100	817	817.0	816.8	809.8	Locked
SW27	1013	1100	910	910.0	909.8	846.3	Locked	SW28	1011	1100	766	766.0	766.1	762.8	Locked
SW29	1012	1100	808	808.0	807.4	787.6	Locked	SW30	1014	1100	773	773.0	772.5	761.7	Locked
SW31	1010	1100	806	806.0	805.5	807.2	Locked	SW32	1009	1100	779	779.0	778.7	783.0	Locked

Status:

Reconnect | Offline | Online | Off | On | Ramp | Pause | Resume | Lock | Unlock | Reset

ICD Documentation

- Web based format for easy access on-site or remotely
  - ➢ html, jpg/gif & pdf
- Complete mapping of ICD hardware from scintillator tile to calorimeter ADC channel
  - ➢ Tested readout with pulsers, cosmics & radiation source
    - o Also on oscilloscope in detector hall
- Detailed instructions for control room shifters *(Move to non-expert mode)*
  - ➢ High & Low Voltage
    - o Strip Tools for inst. Monitoring
  - ➢ Preamp & LED Pulsers
  - ➢ Checklists
- Histogram & hbook index
  - ➢ Archive commissioning
  - ➢ Reference plots
- Online logbook
  - ➢ Archive all control room activity *(good or bad)*

Shift Work

- Pre-March 2001
  - DØ Commissioning
    - o grunt work (cabling)
    - o software, Monte Carlo
  - ICD preparation
    - o cosmic ray test stand
    - o built & tested components at Latech
    - o cabling (signal,LV,HV,LED)

- Post-March 2001 *(the real work)*
  - Full ICD Hardware & Electronics Installation
    - o Stage 1: April-May 2001 → Stage 2: Oct-Nov 2001
  - ICD Commissioning & Integration into Calorimeter System
  - Control Room Shifts: *Calorimeter, DAQ, DOC*
    - oLouisiana Tech: 100+ CR shifts since March 2001
      - ✓ In 2001: 11% of Calorimeter total & 4% of DAQ total

Repair & Maintenance

- Spare Parts at DØ
  - 6 complete electronics drawers
  - LV & SHV cables
  - Preamps & HV bases
- Tools, oscilloscope, laptop
- Planned detector accesses in late May & month of August
  - Detector must be open in order to repair ICD channels
- New PMTs on order
  - old PMTs main source of channel failure

Summary

Done

- Fully instrumented & part of global data taking since Nov 2001
  - ➢Being used in MET and Jet Energy Scale studies!
- Integrated into CAL Readout & Shift Guide
- Stable HV system
- Spare electronics & cables in stock
- Working LED calibration system

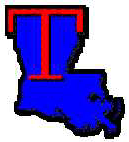
To Do

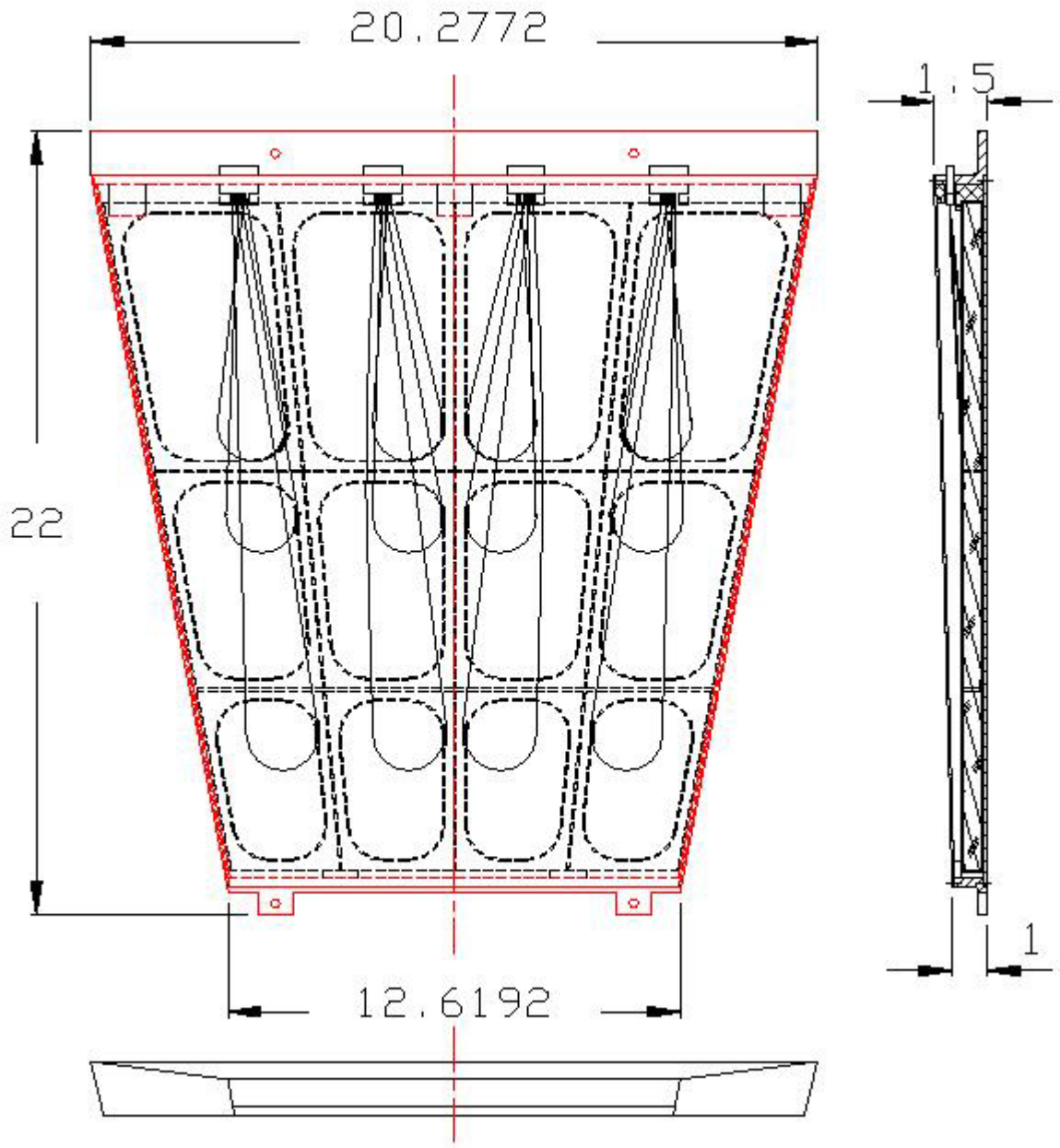
- Provide support for repair & maintenance during detector shutdowns
  - ➢Aug 2002 (five weeks)
- 4 DØ Notes in pipeline
- Fine-tune energy scale & weights
- Improve MC geometry & material representation
- Control room shifts

Supplemental Slides

25 March 2002
2002 DOE Review

Alan L. Stone
Louisiana Tech University





Mechanical drawing of the ICD tile module with wavelength shifting fibers.

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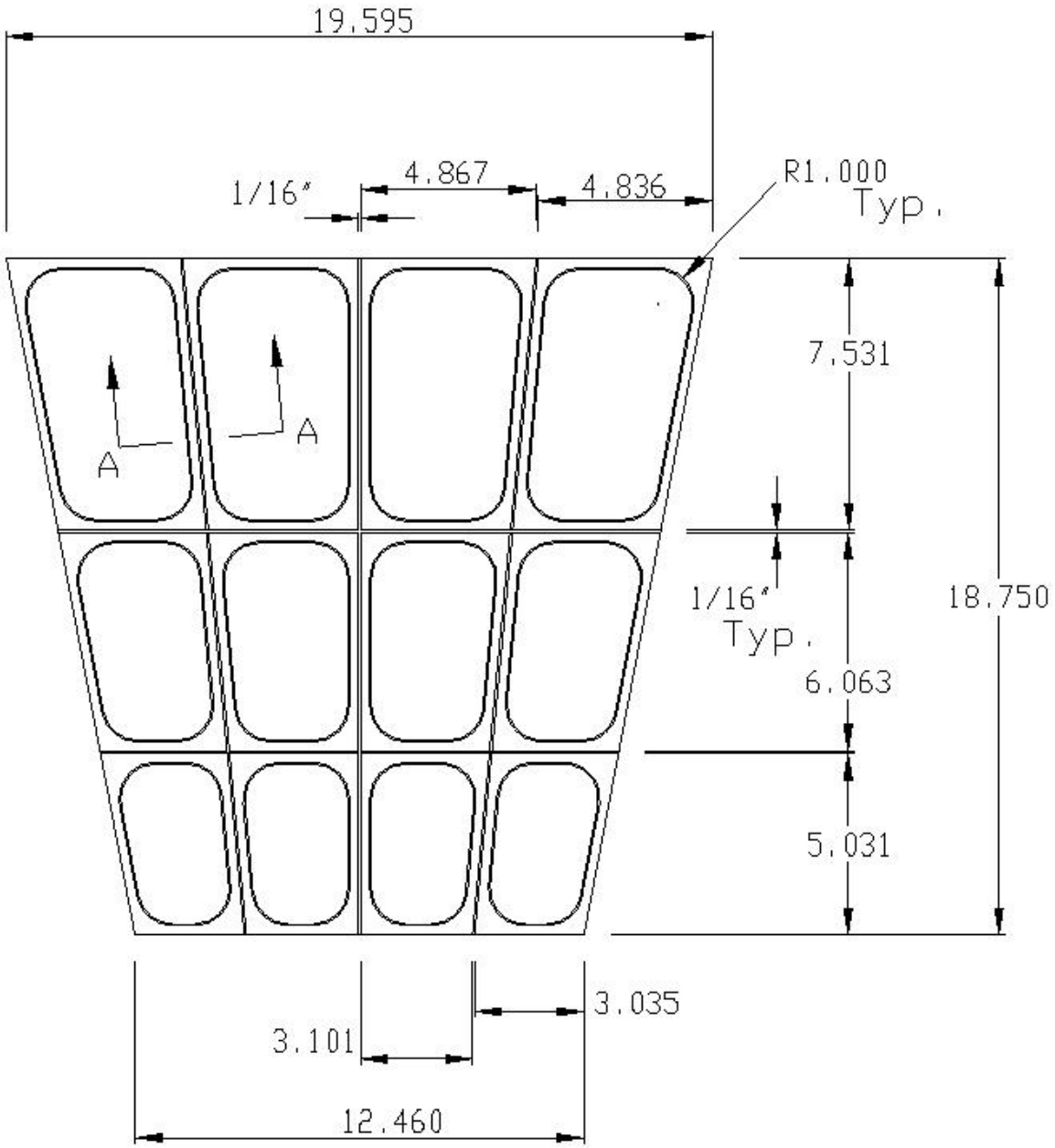
Louisiana Tech University



Mechanical drawing of the ICD scintillator tile.

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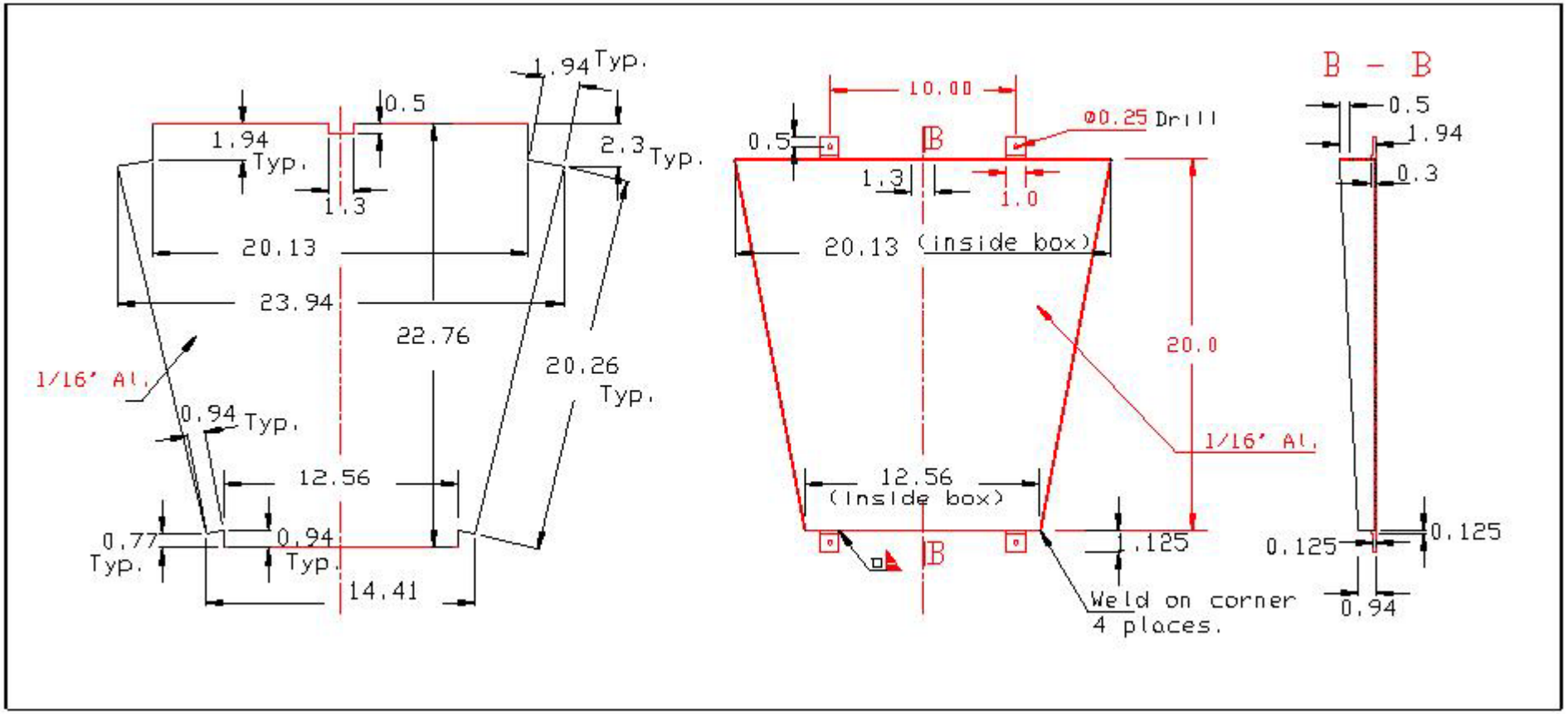
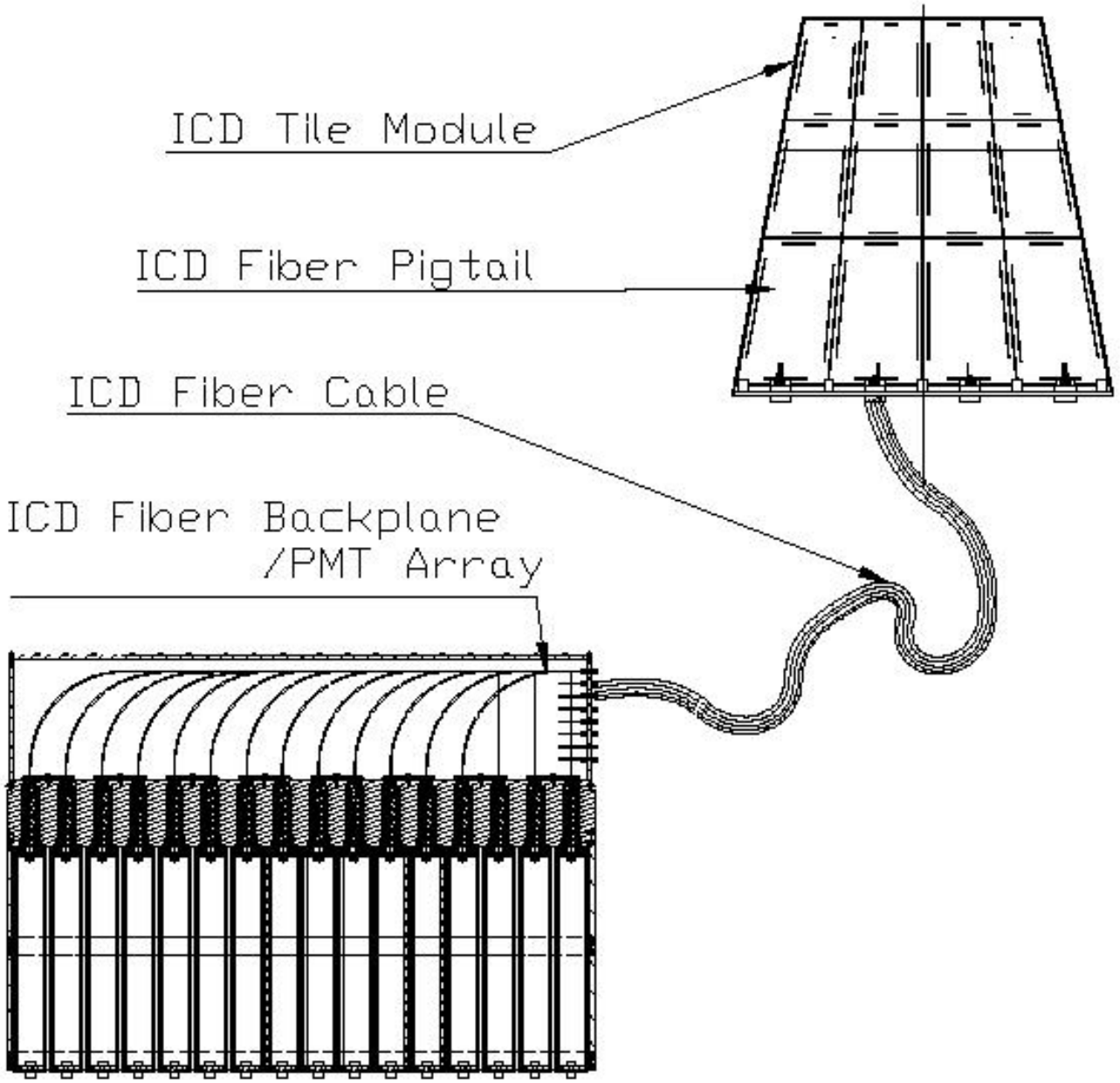
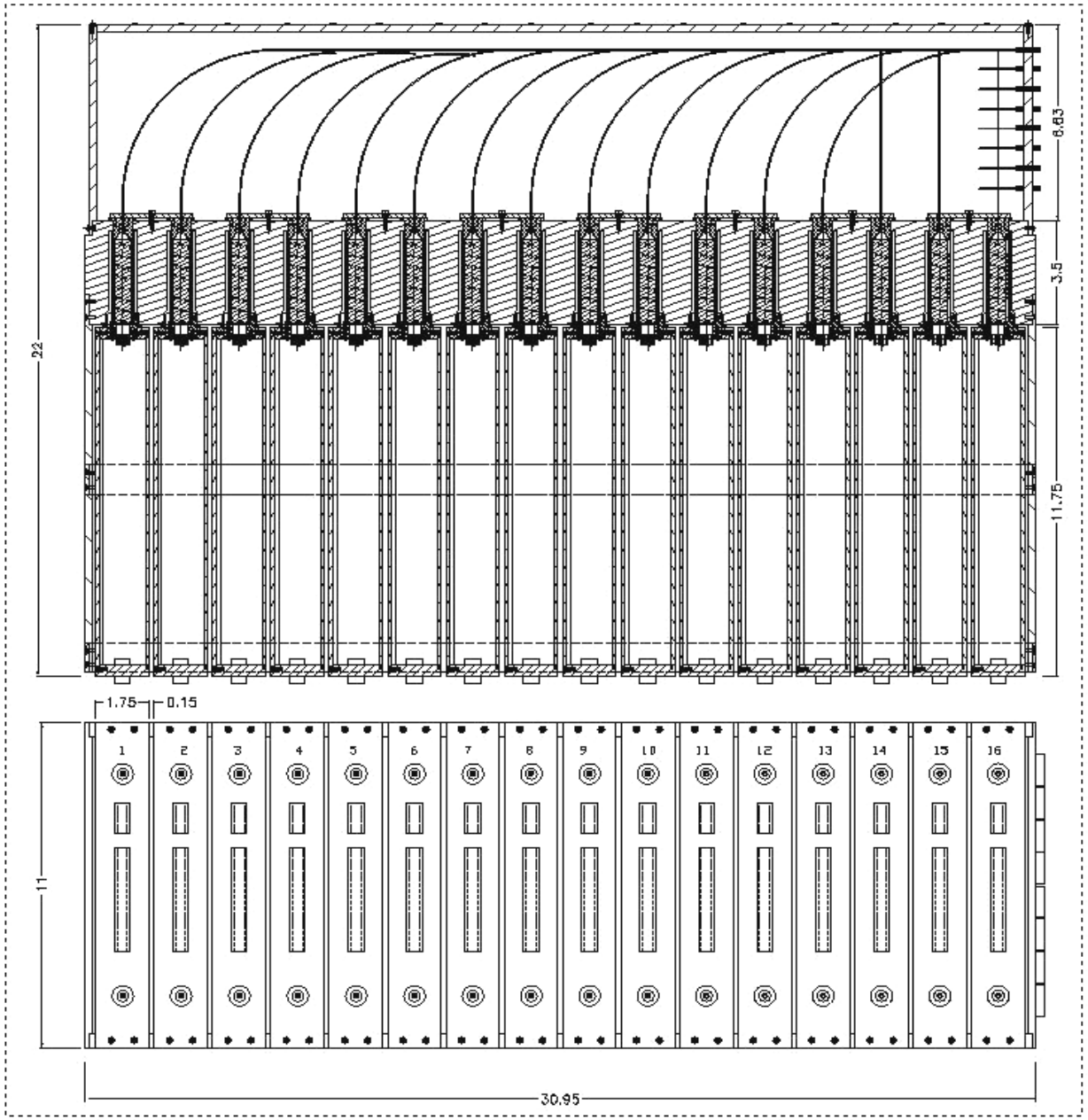


Mechanical drawing of the aluminum box which contains the ICD scintillator.



Drawing (not-to-scale) relating ICD tile module to ICD crate and backplane.



ICD Crate Schematic: Fiber backplane, iron block with PMT socket holes & drawer rails (top view); electronics drawers (front view)

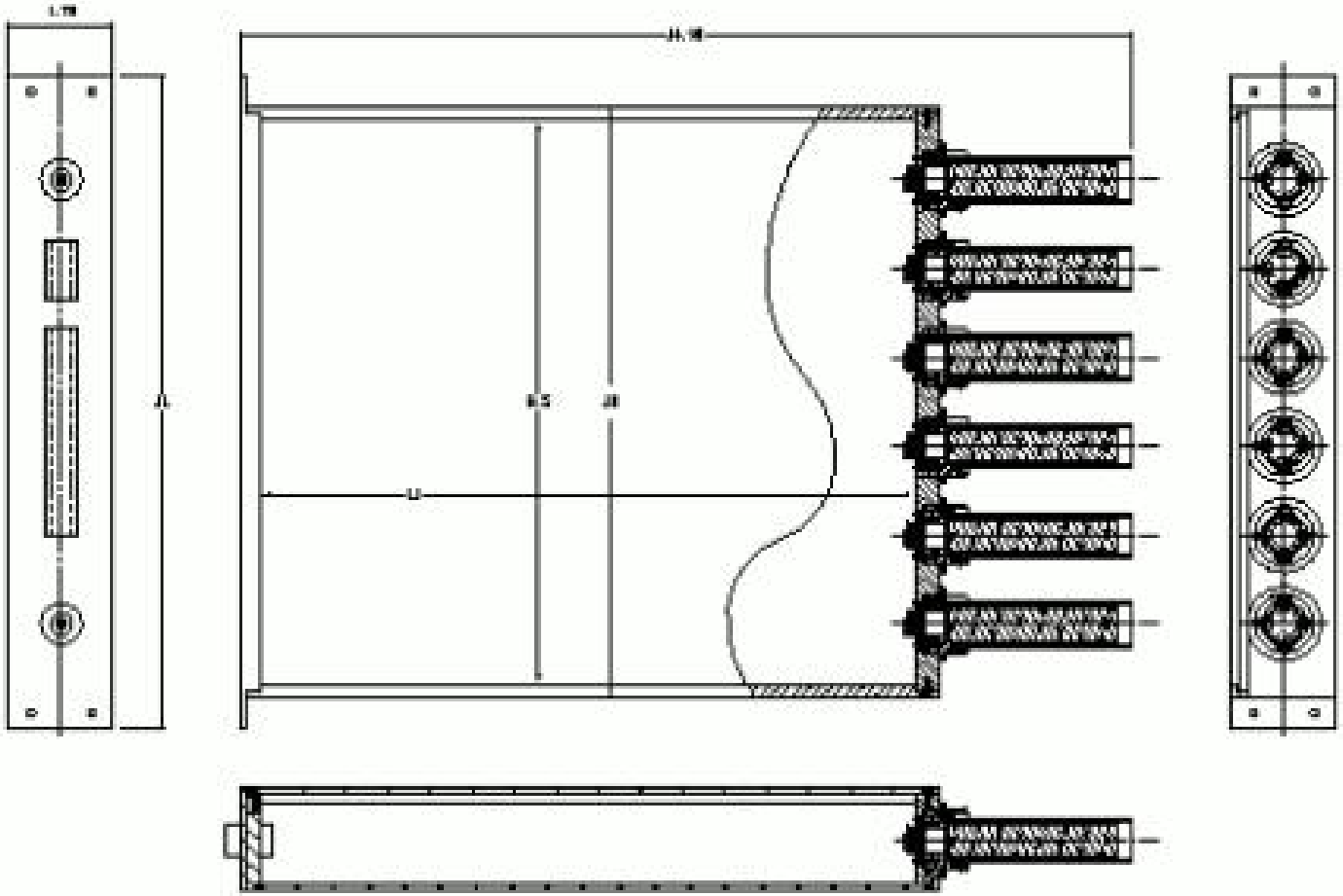
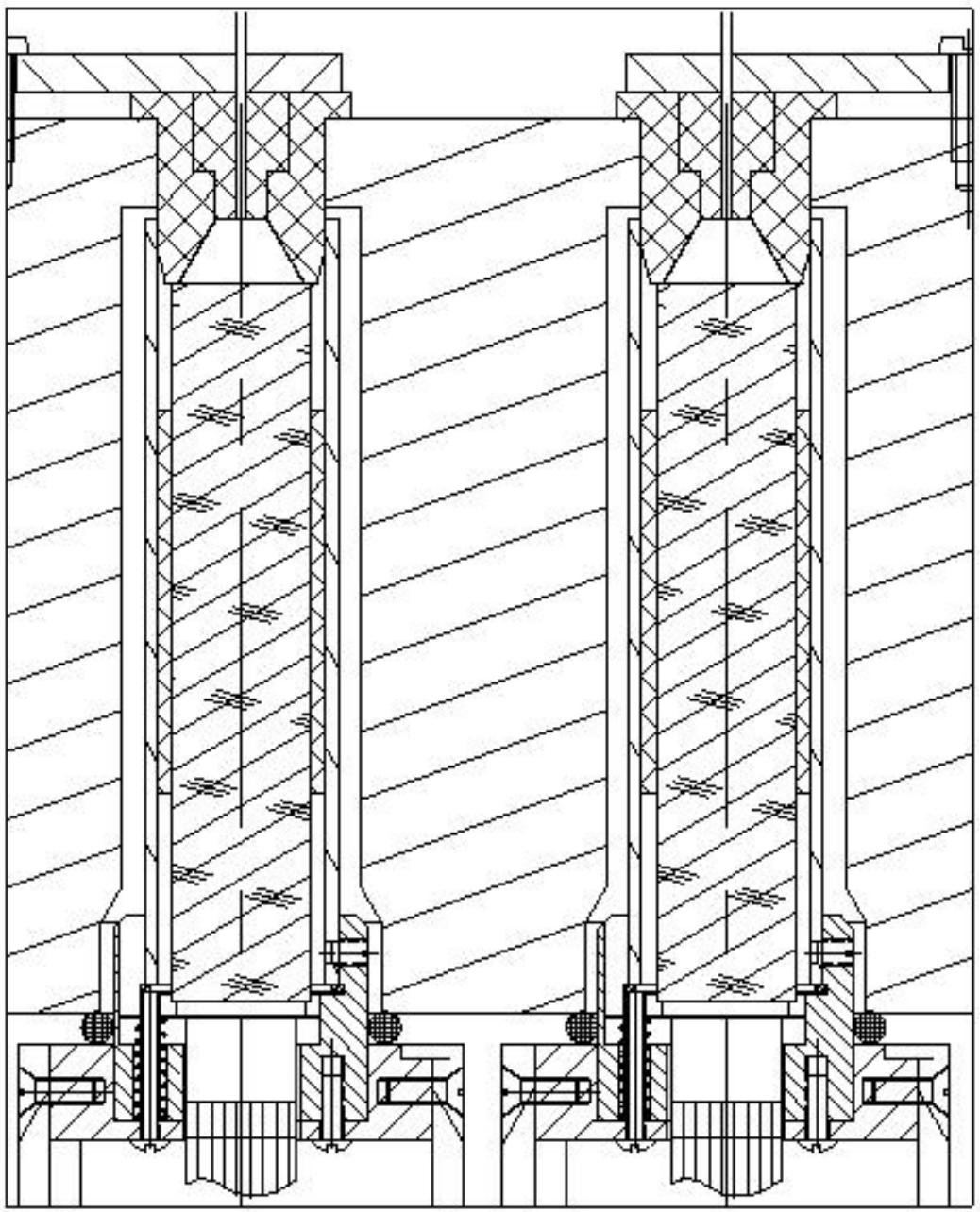


Figure 1 Layout of the ICD drawer system, housing the PMTs, PMT bases, preamplifiers, and associated electronics for the ICD readout.



ICD Photomultiplier housing inside iron block. At the base of each "hole" is a rubber stopper or cookie which mates with the PMT, spring-mounted to the electronics drawer.

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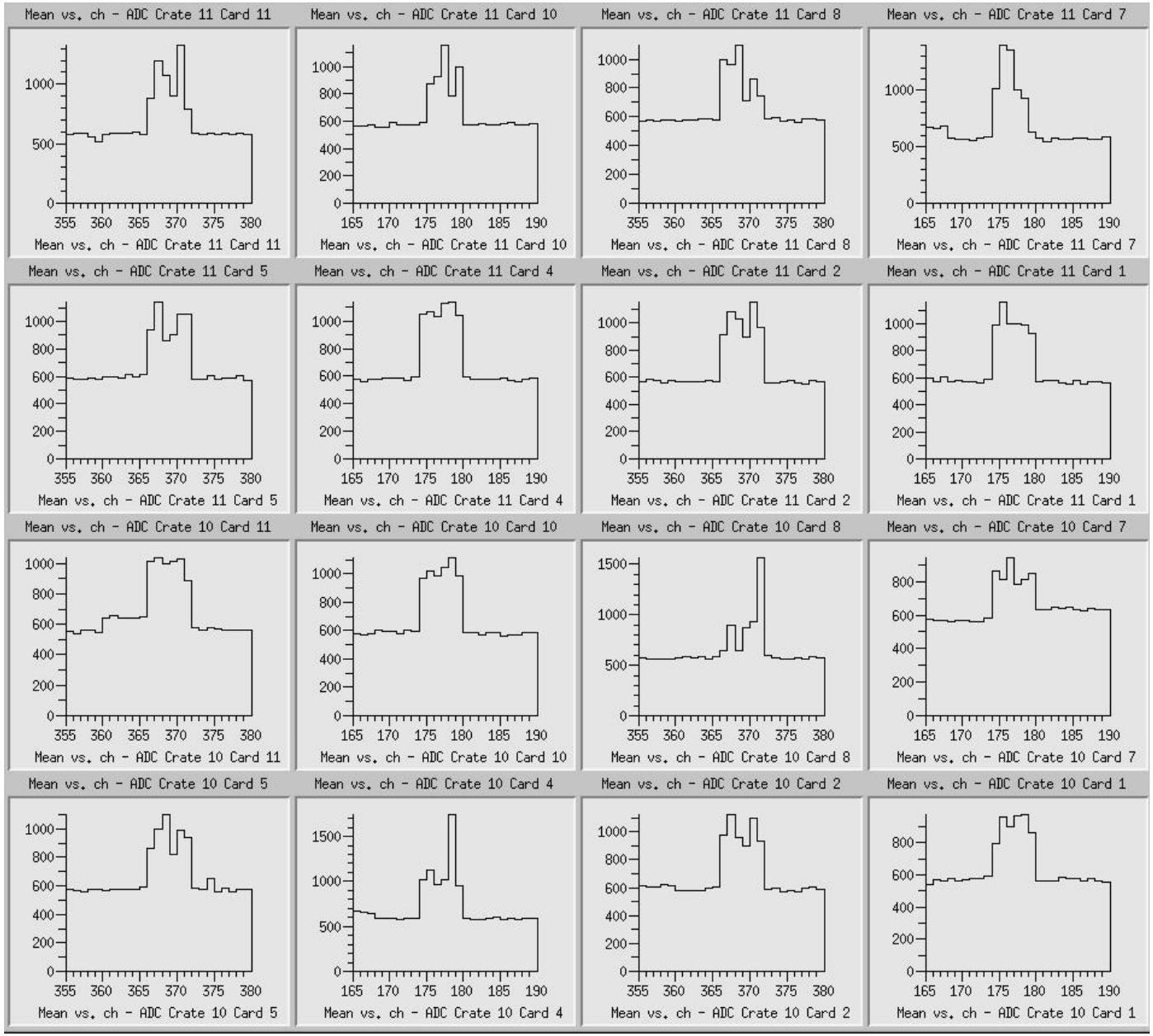
ICD Run II Hardware Mapping - Netscape

File Edit View Go Communicator Help

All ICD Run II channels are in: Layer 9, Tower 2, Depth 6-11 and ADC Channels 174-179 or 366-371.
BLS Card 3 (ADC 1,4,7,10) or BLS Card 7 (ADC 2,5,8,11).
Preamp Box: NW = 12, NE = 13, SW = 14, SE = 15. Preamp Boards = 1-16, Preamp Tower = 0, Preamp Depth = 0-5.
LMB Channel 1 = NW, Channel 2 = NE, Channel 3 = SW, Channel 4 = SE.

Ieta	Phi (1-64)	Sector (0-31)	Crate (0-11)	ADC (0-11)	Drawer	Ch. (1-6)	Slot	Pulser (0-63)	Tile	Fiber	PMT	HV	Pod	HV Ch.	Gain
-14	2	24	10	1		1	NE9	23	PRD06	P06-01	5085	800	NE17	49	176
-13	2	24	10	1		2	NE9	23	PRD06	P06-01	5348	765	NE17	50	140
-12	2	24	10	1		3	NE9	23	PRD06	P06-01	8006	800	NE17	51	91
-14	1	24	10	1		4	NE9	23	PRD06	P06-02	5077	807	NE18	52	136
-13	1	24	10	1		5	NE9	23	PRD06	P06-02	5225	785	NE18	53	142
-12	1	24	10	1		6	NE9	23	PRD06	P06-02	9148	(750)	NE18	54	unk
-14	4	25	10	2		1	NE10	22	PRD07	P07-03	8007	800	NE19	55	zero
-13	4	25	10	2		2	NE10	22	PRD07	P07-03	8253	789	NE19	56	158
-12	4	25	10	2		3	NE10	22	PRD07	P07-03	5108	753	NE19	57	139
-14	3	25	10	2		4	NE10	22	PRD07	P07-04	7578	759	NE20	58	143
-13	3	25	10	2		5	NE10	22	PRD07	P07-04	2043	729	NE20	59	147
-12	3	25	10	2		6	NE10	22	PRD07	P07-04	7107	714	NE20	60	151
-14	6	26	10	4		1	NE11	21	PRD07	P07-01	7577	761	NE21	61	133
-13	6	26	10	4		2	NE11	21	PRD07	P07-01	4280	791	NE21	62	152
-12	6	26	10	4		3	NE11	21	PRD07	P07-01	4574	773	NE21	63	120
-14	5	26	10	4		4	NE11	21	PRD07	P07-02	3127	795	NE22	64	146
-13	5	26	10	4		5	NE11	21	PRD07	P07-02	6421	812	NE22	65	137
-12	5	26	10	4		6	NE11	21	PRD07	P07-02	8011	786	NE22	66	136
-14	8	27	10	5		1	NE12	20	PRD14	P14-03	8274	751	NE23	67	138
-13	8	27	10	5		2	NE12	20	PRD14	P14-03	4740	751	NE23	68	124
-12	8	27	10	5		3	NE12	20	PRD14	P14-03	7467	737	NE23	69	117
-14	7	27	10	5		4	NE12	20	PRD14	P14-04	7573	734	NE24	70	140
-13	7	27	10	5		5	NE12	20	PRD14	P14-04	7981	791	NE24	71	152
-12	7	27	10	5		6	NE12	20	PRD14	P14-04	5273	751	NE24	72	127



Calorimeter Electronics application: cal_elec shows ADC counts versus ADC channel.

ICD channels for all the NE crate are shown.

LED pulser data from 5 Feb 2002.

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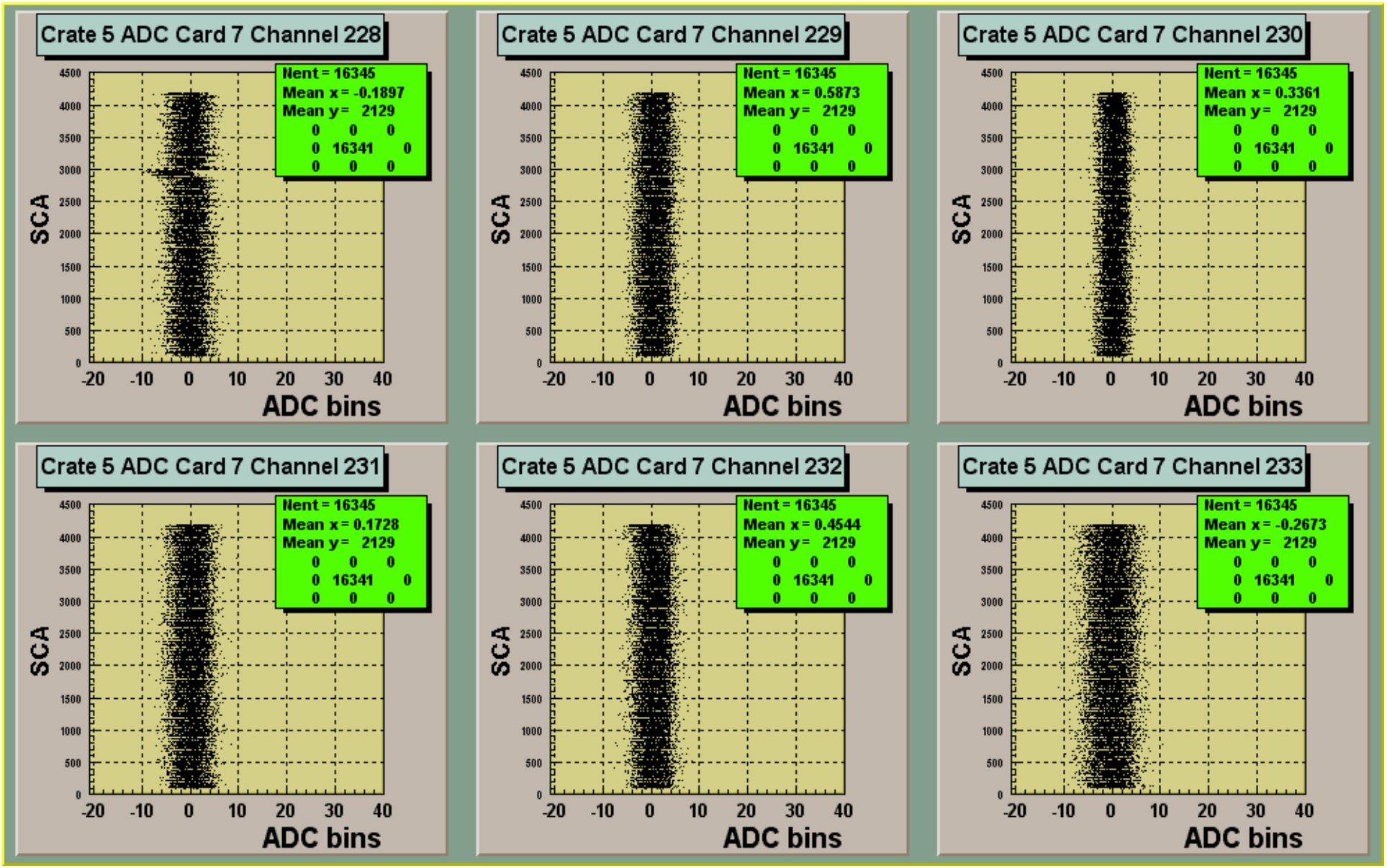
Louisiana Tech University



L2 SCA error

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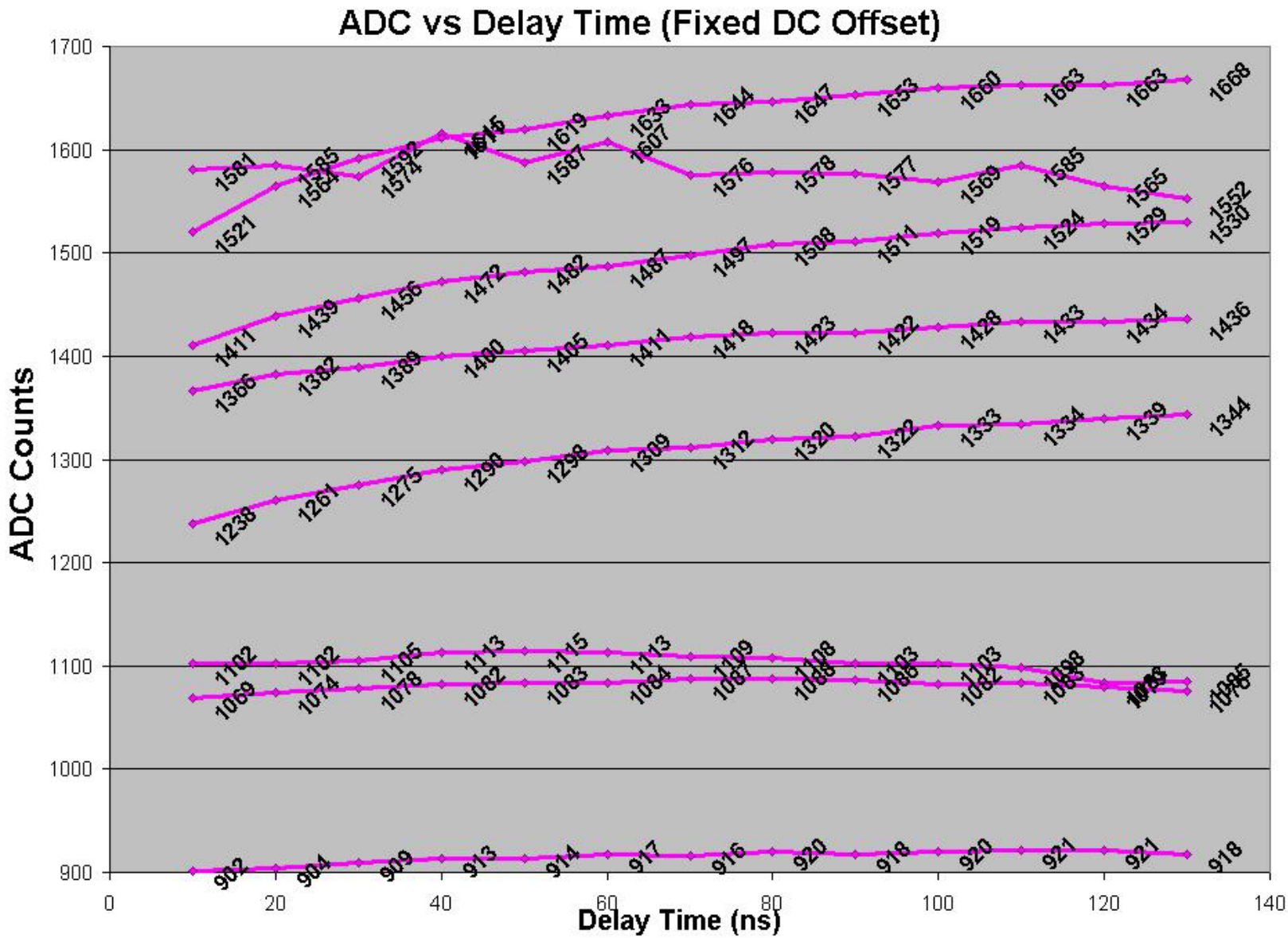

LED Pulser data: 5 March 2002. Single channel from each of the 8 Calorimeter readout crates (which contains ICD).

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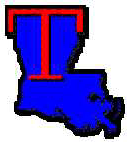
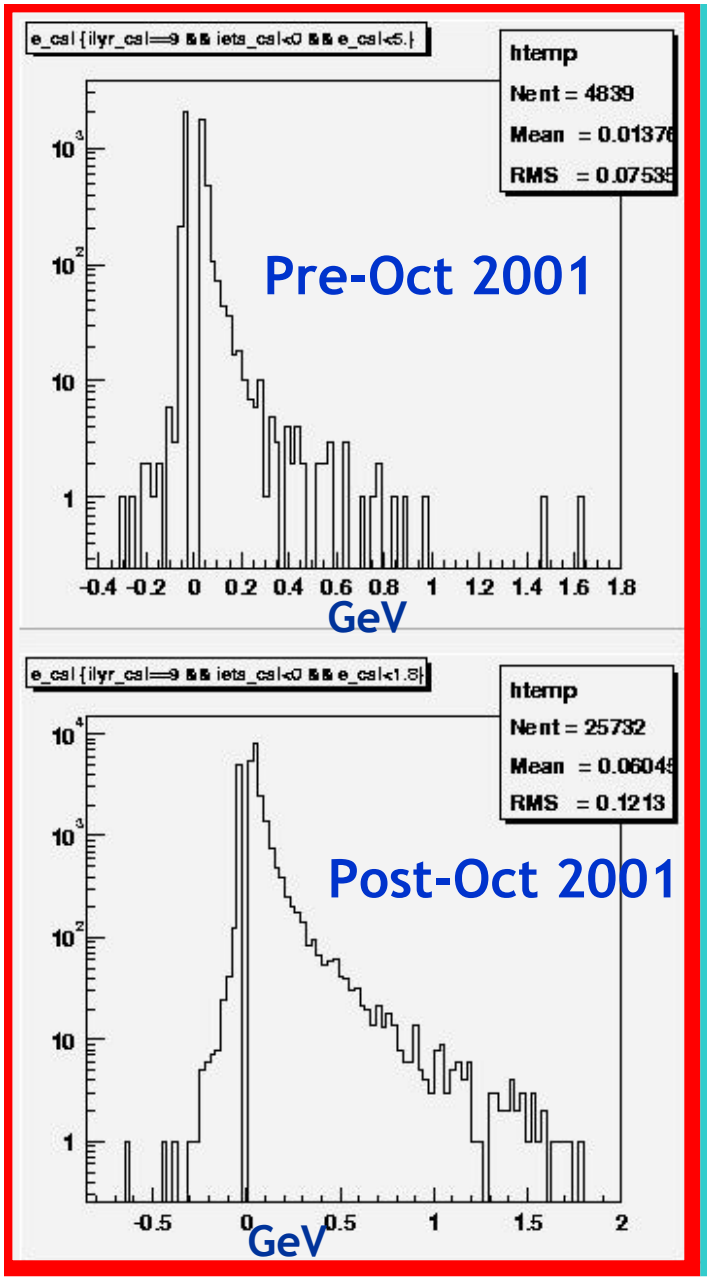
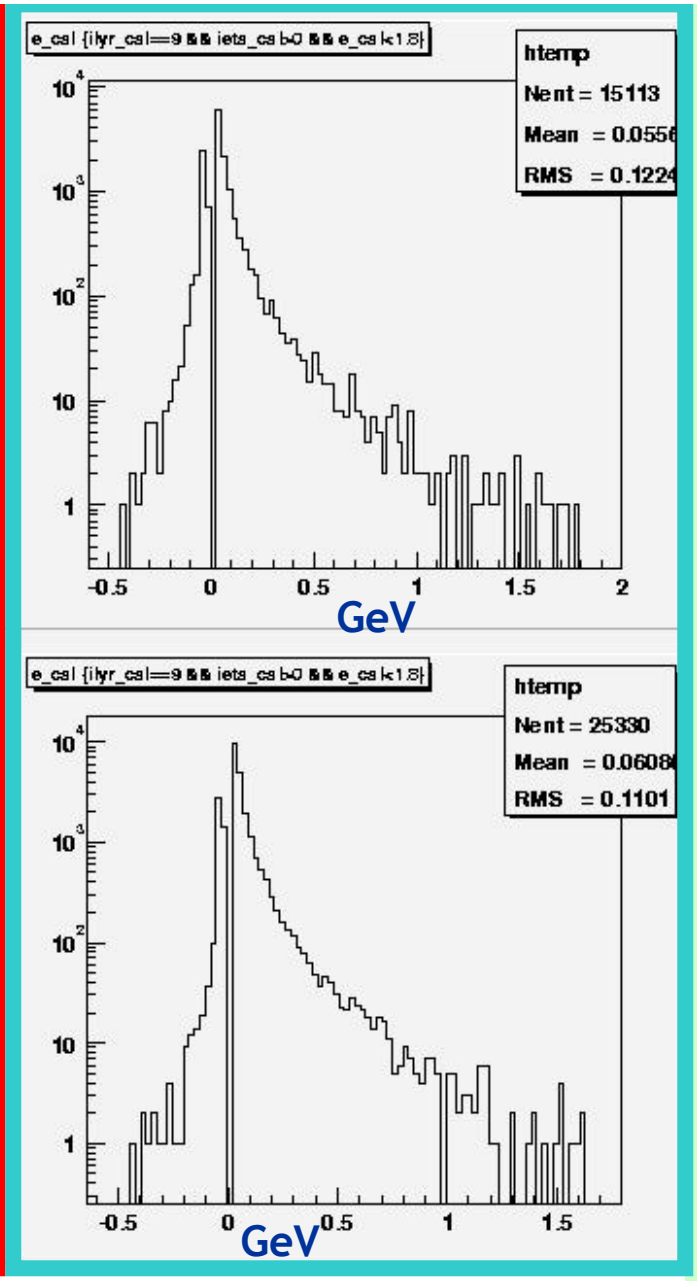
Louisiana Tech University

year view | month view | << July 2001 >> CAL preferences | week view | day view

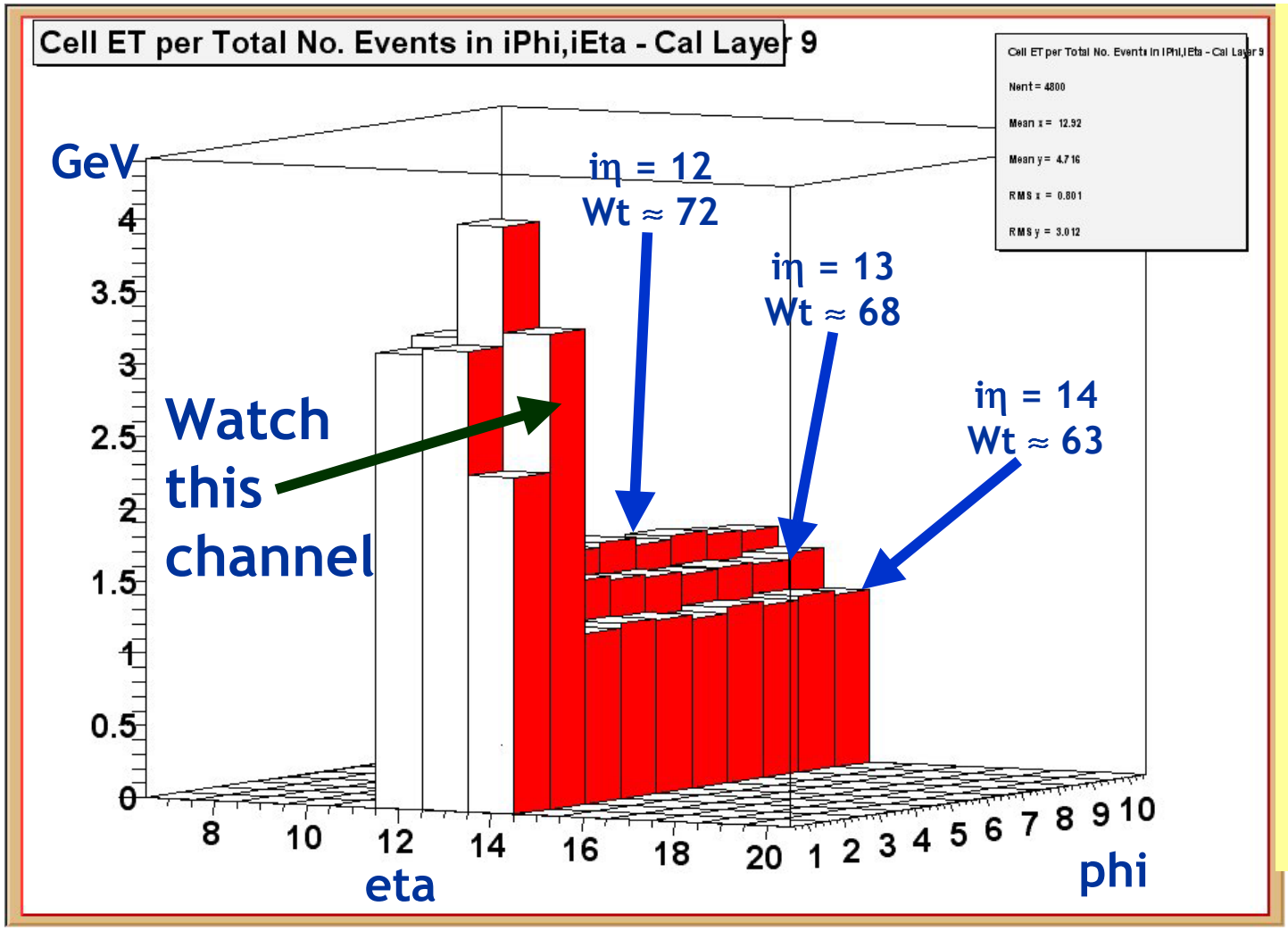
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 00:00 Mingcheng Gao 08:00 Shouhua Fu 16:00 Ted Eltzroth	2 00:00 Mingcheng Gao 08:00 Shouhua Fu 16:00 Ted Eltzroth	3 00:00 Mingcheng Gao 08:00 Pierre Petroff 16:00 Bob McCarthy	4 00:00 Mingcheng Gao 08:00 Shoahua Fu 16:00 Bob McCarthy	5 00:00 Mingcheng Gao 08:00 Shoahua Fu 16:00 Bob McCarthy	6 00:00 Mingcheng Gao 08:00 Shoahua Fu 16:00 Bob McCarthy	7 00:00 Pavel Demine 08:00 Laurent Duflot 16:00 Pierre Petroff
8 00:00 Rama Calaga 08:00 Laurent Duflot 16:00 Nirmalya Parua	9 00:00 Pierre Petroff 08:00 Laurent Duflot 16:00 Nirmalya Parua	10 00:00 Pierre Petroff 08:00 Shoahua Fu 16:00 Nirmalya Parua	11 00:00 Laurent Duflot 08:00 Stephanie Beauceron 16:00 Nirmalya Parua	12 00:00 Laurent Duflot 08:00 Stephanie Beauceron 16:00 Nirmalya Parua	13 00:00 Laurent Duflot 08:00 Stephanie Beauceron 16:00 Nirmalya Parua	14 00:00 Pavel Demine 08:00 Stephanie Beauceron 16:00 Bawo Daibo
15 00:00 Marc Hohlfeld 08:00 Stephanie Beauceron 16:00 Bawo Daibo	16 00:00 Pierre Petroff 08:00 Bob McCarthy 16:00 Bawo Daibo	17 00:00 Stephanie Beauceron 08:00 Bob McCarthy 16:00 Bawo Daibo	18 00:00 Stephanie Beauceron 08:00 Bob McCarthy 16:00 Alan Stone	19 00:00 Stephanie Beauceron 08:00 Bob McCarthy 16:00 Alan Stone	20 00:00 Stephanie Beauceron 08:00 Pierre Petroff 16:00 Alan Stone	21 00:00 Reiner Hauser 16:00 Alan Stone
22 00:00 Reiner Hauser 08:00 Pavel Demine 16:00 Alan Stone	23 00:00 Rama Calaga 08:00 Gerard Sajot 16:00 Alan Stone	24 00:00 Rama Calaga 08:00 Gerard Sajot 16:00 Pierre Petroff	25 00:00 Alan Stone 08:00 Gerard Sajot 16:00 Sabine Crepe-Renaudin	26 00:00 Alan Stone 08:00 Gerard Sajot 16:00 Sabine Crepe-Renaudin	27 00:00 Alan Stone 08:00 Lee Sawyer 16:00 Sabine Crepe-Renaudin	28 00:00 Alan Stone 08:00 Lee Sawyer 16:00 Pavel Demine
29 00:00 Reiner Hauser 08:00 Dick Greenwood 16:00 Lee Sawyer	30 00:00 Pierre Petroff 08:00 Dick Greenwood 16:00 Lee Sawyer	31 00:00 Gregorio Bernardi 08:00 Dick Greenwood 16:00 Mike Tuts				







Comparison of pre-Oct 2001 data and post-Nov 2001 data. The north part of the ICD (η<0) was barely instrumented prior to Oct 2001. The left plots (top & bottom) show the change in the average event energy in the north ICD channels pre/post shutdown. The right plots are of the south ICD, which had been fully instrumented by end-May 2001.



HV turned off on all but 6 ICD channels.
The LED Pulser is turned on at 8.6 V, 100 ns delay.
The signal is unsuppressed, so one can see the average pedestal, which is about constant for a fixed eta, and increases as eta decreases.

Decrease the HV on only one channel by 50 V to test caladdress mapping & ADC/GeV conversion.

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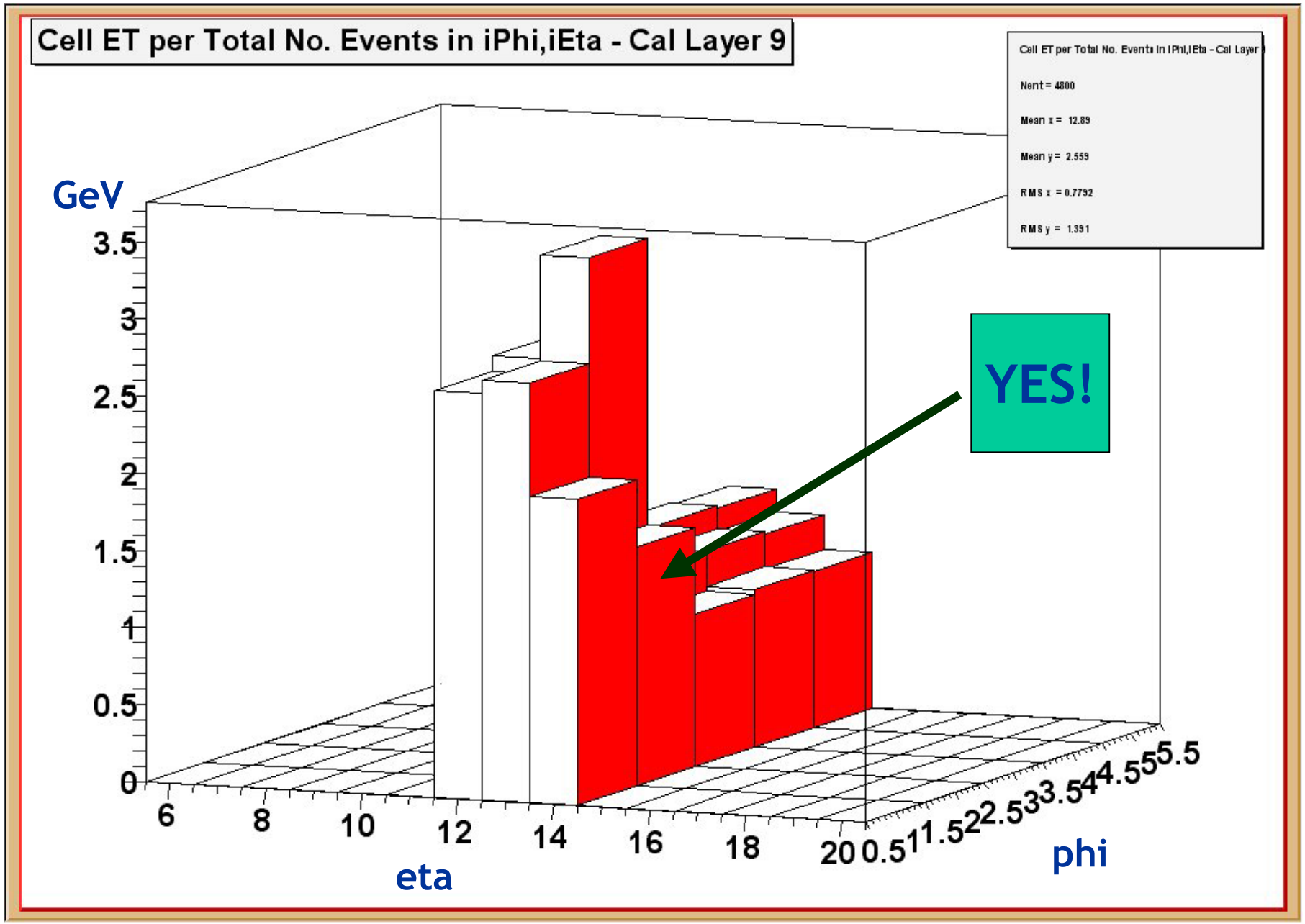
Louisiana Tech University



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Alan L. Stone
Louisiana Tech University